The Excavating Engineer

(FORMERLY STEAM SHOVEL NEWS)

PUBLISHED MONTHLY

Ten Cents Per Copy *One Dollar Per Year*

Vol. 9 **MILWAUKEE, JANUARY 1913** **No. 4**

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THE EXCAVATING ENGINEER PUBLISHING COMPANY

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267 NATIONAL AVENUE MILWAUKEE, WIS., U. S. A.

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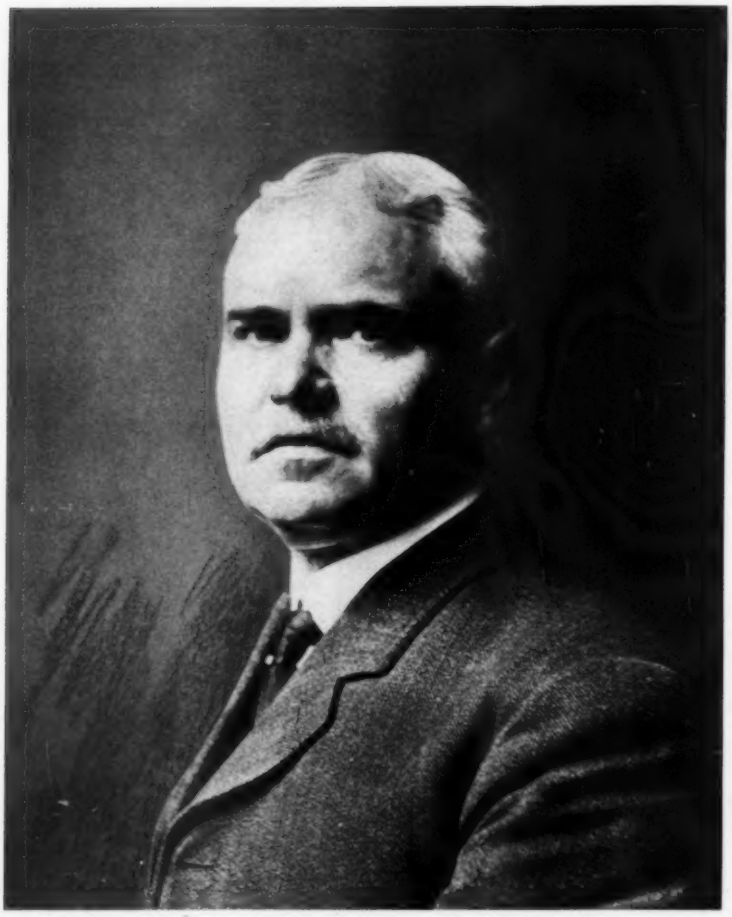


Colonel George Washington Goethals.

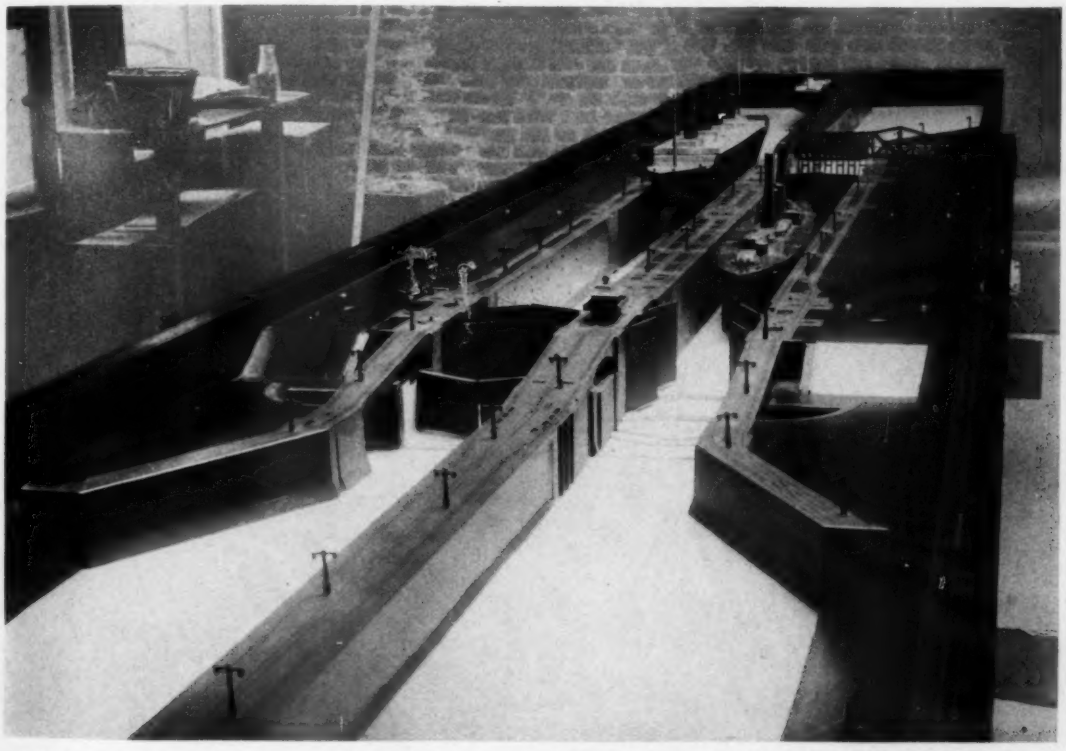
Graduate of the United States Military Academy, 1880. Lieutenant of Engineers, 1880-1891. Captain, 1891-1899. Major of Engineers' Corps, 1899-1900. Graduate of the Army War College, 1905. Lieutenant Colonel of Engineers, 1907. Chief Engineer of the Panama Canal, since February 26, 1907.

Models Used as an Engineering Aid in Building Canal Locks on Panama Canal

By Waldon Fawcett

EXCAVATING engineers, contractors and those engaged in construction work of various kinds are coming to depend more and more upon accurate models of the completed work as aids and guides fulfilling a unique function. Indeed such miniature representations, carefully built to scale, answer purposes which would not otherwise be served. Drawings and specifications suffice for the trained mind of the engineer but there are times when he has need of something more tangible with which to outline prospective work for the benefit of the layman or the co-worker who has not the proverbial imagination of the successful engineer. On the other hand, daily photographs such as are now made on all large projects constitute an admirable record of actual progressive construction but obviously the work yet to be done is beyond their limitations.

Augmenting these time-tried standard mediums is the model,—a working model or a relief or topographical model as circumstances, and the character of the work to be portrayed may dictate. Although the provision of models as preliminaries to construction work is a comparatively recent innovation it has already come to be realized that such models are of tangible value and assistance to engineers and contractors in mapping out plans of campaign, keeping tab on the work in progress, etc. This then is the chief function of the up-to-date model in this field but, as above mentioned, it has an important supplementary mission in vivifying the project in the making for the benefit of absent stock-



Model of the San Pedro Miguel Lock Showing Double Gates and Tracks for Electric Locomotives Used in Towing Vessels While Being Locked Through the Canal.

holders or distant boards of directors or, mayhap, even for the casual visitor to the scene of operations who would fain gain an idea of the undertaking in finished state.

It is befitting the greatest and most progressively administered engineering project of the century that models should be extensively employed in connection with the construction of the Panama Canal. Dozens of models of the inter-oceanic waterway have been prepared for one purpose or another but probably the most significant are those built to the order of the United States government for use in the office of Col. Goethals, Engineer-in-Chief of the Canal. These particular models are, of course, excellent examples of what such models should be and they are interesting to technical men as exemplifying the class of model calculated to prove most serviceable to a superintending constructor using it as a key to day-to-day operations.

Most of the Canal models have been constructed on a scale of 400 feet to the inch and the whole process of manufacture of these models is interesting as disclosing the absolute accuracy of which they are susceptible. As the first step in the preparation of a model there is provided a contour map of the territory to be represented. This must be of the same dimensions as the model is destined to be and if the contour map originally provided for the purpose does not thus conform a copy in the proper scale must be obtained by enlargement or reduction. With this map as a guide outlines are traced in pencil on the wooden platform that is to form the base of the model,—presuming, of course, that we are dealing with a relief model.

Next comes the arduous task of "building up" those sections of the model surface designed to represent elevations, etc.,—details which are numerous in the Canal models in all of which the line of the waterway must be marked amid surroundings more or less elevated. The "embossed" effect representative of mountains, grades, etc. is obtained by superimposing one upon another successive

The 70-Ton Bucyrus Steam Shovel Which Holds the Record for Amount of Material Excavated Within a Given Time on the Panama Canal.

layers of cardboard cut by scroll saw in the exact outlines required by the character of the country represented. These pieces of cardboard are pasted and also nailed in position and the fact that the cardboard layers are thin and that the size of successive layers may be varied ever so slightly renders it possible to accurately reflect not only the height of any elevation but its contour and relation to surrounding natural objects.

After this cardboard "falsework", if it may be so denominated, has been completed, the whole surface of the map-like model is covered with a thin layer of clay, the clay being so mixed with oil as to obtain a consistency that does not harden rapidly and consequently permits the outlines to be moulded in exact accord with detailed requirements. Finally a coat of shellac is applied to the entire surface.

The model thus constructed is not, in most instances, the construction that is turned over to the engineer. In effect it becomes the model of a model and from this original is taken a plaster mould from which in turn there may be cast as many models as may be desired. This means for duplication is of importance when, as in the case of the Panama Canal models, extra models are desired for exhibition at international expositions; use by firms furnishing material for the canal construction; reference collections in museums, etc., etc. As many as fifty such models may be taken from one mould ere it begins to show signs of deterioration.

An important operation incident to the finishing of a model is the painting of the entire surface in oil colors. Various colors and tints are employed, just as a distinctive color scheme is utilized in the case of ordinary maps to differentiate between contrasting physical characteristics or different earth and rock formations. This work is all done by hand and is very tedious there being devoted to it a considerable share of the interval of six months to a year which may be required to fashion a model complete. After the artists, who are specialists in their line, have completed the painting of the model surface the latter is given a coat of varnish,

Model Showing Birds Eye View of Pedro Miguel Locks. The Small Black Objects on Each Side of the Vessels are the Electric Towing Locomotives.

UMI

and thereupon the model which may weigh as much as 200 pounds and represent an investment of hundreds of dollars, is pronounced complete.

Most of the Panama Canal models thus far made,—and they constitute the last word in this form of construction,—are of the relief type but working models have been provided in the case of some of the Canal locks. The working model is, of course a faithful representation in miniature of the construction work it is designed to portray, with the added advantage that all working parts are operative. In the case of the Panama lock models the gates, etc. may be manipulated and small ships are actually locked through. For the operation of a working model of this kind power is provided by a ⅛ or 1–16 horsepower electric motor. Such models possess superior advantages for general exhibition purposes where the interest of the public is to be enlisted but are of no more—if as much—tangible assistance to the practical engineer than the relief model which embraces in its scope a larger section of the work, geographically speaking, than can be included in any one working model.

Notable among the Isthmian Canal Commission's models which have been produced at the model shops adjoining the general offices of the Commission in Washington are several of the Gatun dam, spillway and locks,—one of the crowning features, from an engineering standpoint, of the entire canal project. These models are rendered especially effective by reason of the extensive use of concrete in the works in question,—concrete constituting a medium which may be readily simulated both in form and appearance in models of this kind. In the models, as in reality, the lock chambers are of concrete and the Spillway is concrete lined, the model being accurate even to the details of the concrete dam in the Spillway together with the gates and machinery for regulating the water level of Gatun lake. The Spillway, it may be noted in this connection, is to contain about 225,000 cubic yards of concrete. There is also representation of the power house at the Gatun Spillway, one of the important permanent structures of the Canal and where will be generated (by means of water turbines from the head created by Gatun Lake) the electricity used to tow all vessels into and through the locks and to operate all gates, valves, etc.

The models of the Gatun locks not only show the three pairs of locks in flight but emphasize those details which render the construction at Panama unique among works of this kind. For instance there are clearly shown in the models not only the regular lock gates of steel construction but also the intermediate gates which will be used in the locks in order to save time and water when small vessels

A 70-Ton Bucyrus Steam Shovel in Some of the Real Digging Encountered on The Panama Canal

are being locked through. By means of these intermediate gates the regular lock chambers 1,000 feet in length may each be divided into chambers 600 and 400 feet long, respectively. Inasmuch as 95 per cent of the vessels navigating the high seas do not exceed 600 feet in length it will be seen that it is well worth while to provide the smaller lock chambers. Indeed such will be the saving of time and water by this method that it is estimated that it will be possible to make 58 lockages a day when the partial length locks are used as compared with 41 lockages a day if the full dimension of the lock chamber be used in every instance.

There are also clearly shown in the new models the electric locomotives which will be used to tow vessels through the locks and the tracks on which these locomotives will operate. These towing tracks run continuously the entire length of the flight of locks and also extend some distance on the guide approach walls at either end. There are two towing tracks for each flight of locks, one on the side and one on the middle wall whereas on each side wall there is one return track, with a third return track located on the middle wall and common to both of the twin locks.

The miniature ships which are an important adjunct of the Canal Commission's new models are shown in the positions or entering and leaving the locks and each ship is represented as manipulated by four of the electric locomotives, just as will be the actual practice when the canal is in operation. Two of the locomotives, one on each wall, are in advance of the ship and are supplying the towing power, whereas two other locomotives at an equal distance in the rear and similarly placed, one on each wall, aid in keeping the ship centered in the canal and serve as brakes to bring the ship to rest when she is entirely within the lock chamber. For this purpose the locomotives are equipped with a slip drum, towing windlass and hawser which permit the towing line to be taken in or paid out without actual motion of the locomotive on the track.

In one of the models a lock is shown nearly filled for an upward lockage. The protective chain is in position and at the entrance to the lock is a caisson in position and acting as a barrier between the high level above and the low level below the lock. At the right-hand lock is a representation of an emergency dam in its normal position when not in use and directly opposite at the left-hand lock we see a small edition of the other emergency dam swung in position across the lock with the wicket girder down in readiness to support the wickets or gates which complete the barrier. It may be added that not only does the model portray the locks and the canal but likewise the line of the Panama Railway and the relation of both these arteries of commerce to the whole surrounding country.

On the other hand some of the working models, such as the fine one of the Pedro Miguel Locks, do not have such scope as the relief models but instead present merely the one feature of the construction work. However, these working models are on a much larger scale than the relief models and this offers an advantage, aside from the operative feature, in that it permits representation in even greater detail than is practicable in the other class of models. In the Pedro Miguel model, for example, we see depicted not only the lock chambers, gates, etc., but also such details as the trolley, poles between the tracks for the towing locomotives; the culverts; the holes in the floor through which water is admitted to the lock chambers, etc., etc. To add to the realism of this model there are very accurate representations of a battleship and an ocean liner, respectively, in the parallel locks. In the October issue page two of The Excavating Engineer was shown a view of the actual work on this lock.

In conclusion it may be noted that models are by no means the only up-to-date adjuncts made use of by the progressive Chief Engineer of the Canal. In order to secure appropriations to carry on his work Col. Goethals has had to appear each year before the largest and most exacting "board of directors" in the world,—namely the Congress of the United States. To make clear to these national legislators what will ultimately be accomplished at the Isthmus, Col. Goethals has employed the relief and working models which literally discount the future but in order to impress his employers with what has already been done the Chief Engineer has had recourse to specially-prepared moving pictures covering every phase of the operations. These pictures, Col. Goethals has personally interpreted when the animated views have been shown for the benefit of Senators and Representatives in the Capitol at Washington.

Winter

When the ice is on the river,
It is then I start to quiver,
For 'tis then I know that winter time has come,
When the coal man hollers "coal",
And he shoots it down the hole,
My heart begins to beat just like a drum.

For I fear the dreaded bill,
And it makes me have a chill,
Although the bill is bound to make me hot,
But the bill you can't evade,
So I always seek the shade,
And try to take it cool, although I'm not.

When the grocery bill comes 'round,
I madly stamp the ground,
For I can see the prices climbing higher,
It makes me want to fight,
For it really is a fright,
So in rage I go down stairs and choke the fire.

—*R. Fletcher.*

The Excursion Party at the Cow Bay Sand Bank.

The Plant of the Goodwin Sand & Gravel Co. Their Annual Outing.

THE properties of The Goodwin Sand and Gravel Co. are located at Eatons Point, and Cow Bay on Long Island Sound.

At Cow Bay the company owns about 100 acres of splendid sand. The material at this point is loaded by Bucyrus steam shovels into Continental dump cars. The trains of these cars are then hauled by dinkey locomotives to the screening plant. The cars are run onto an overhead track immediately above the storage bins and dumped. From these bins it is carried by a series of bucket elevators to the screens, which are located at a higher level, from which the sand and gravel is distributed according to size to other bins, from which it is loaded into cars which transport it to the loading dock. From these cars the material is dumped into scows, or vessels for shipment to various points. The daily capacity of the Cow Bay plant is five thousand cubic yards.

At Eatons Point, where most of the gravel is secured, the material is dredged and at the present time a channel one thousand feet long, fifty feet wide and thirty feet deep has been removed. We reproduce a photograph of this dredge, in operation, which is of the ladder type.

The gravel is dumped from the buckets onto a washing platform and thence into the cylindrical revolving screens which separate the gravel into five commercial sizes. The various screens discharge on conveyor belts that load as many different scows, which lie along side of the dredge, as there are different sizes of material.

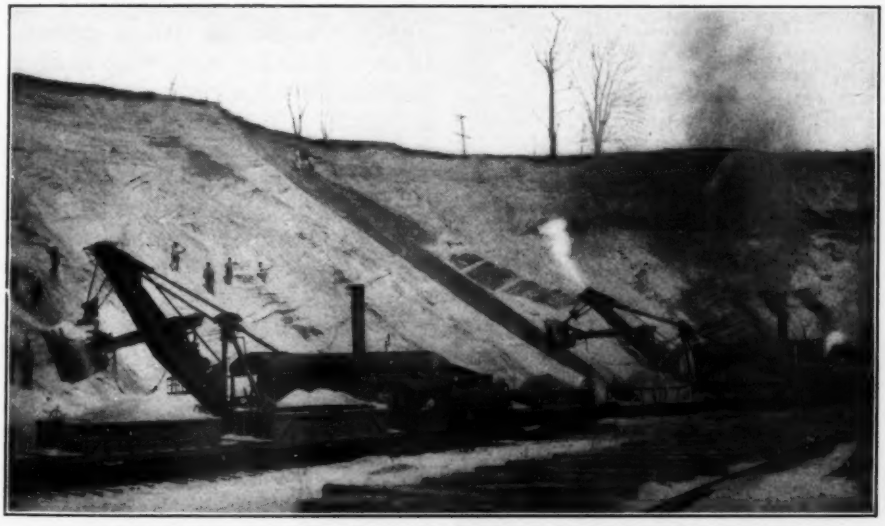
Thus in one continuous operation the gravel is dredged, washed, screened and loaded into five scows carrying respectively sand, grit, roofing gravel, paving gravel and concrete gravel.

Superintendent Young, in charge of the Eatons Point plant, has spent his life in gold dredging operation, and in about every part of the globe where gold is found. He takes great pride in pointing out the fine points of the dredge and keeps the equipment in spick and span shape. "But there's no dirt to clean away", he says, "the washer does that for me". So, of course, we believe it's no trick to run it, and "there's nothing to do till to-morrow".

The output of both plants requires a fleet of five tugboats and one hundred and twelve scows, nearly all of which are owned by The Goodwin Sand and Gravel Co.

It is no unusual thing to see vessels at the company's wharf being loaded with gravel for Key West or Buffalo and other points between.

Each summer the company has an outing and on July 17th, 1912 invited the members of the



Two Trains of Continental Dump Cars, 12-yd. Capacity, with Hopper Bottoms Used by The Goodwin Sand & Gravel Co.

The Excursion Party on the Way to Cow Bay

General Contractor's Association to participate in this annual event. Hence in the early morn on that day Pier 6, on the East River witnessed a joyous gathering of contractors on pleasure bent. "Goodwin No. 14" was lying at the dock in gala dress. She is a staunch handsome vessel and her jolly commander Captain Johnson is proud of the fact. "Jim" Ewing, the host of the occasion, was in his glory. Besides being a good manager he is equally good at entertaining as every guest on the annual occasions will verify.

One of our illustrations shows the party enroute to Cow Bay and just as the camera was snapped a waiter passed down the deck with a familiar looking load and the band played "Everybody's Doing It". And they were.

Cow Bay was reached in short order and the party disembarked to take a trolley ride over the Goodwin Traction Company's lines, in a specially constructed sightseeing car. At the end of the trolley line the car was hauled by a dinky to the various cuts now being operated, and our photographer got a view of us watching one of the big Bucyrus shovels make the dirt fly. The bank at this point is over sixty feet in height, and this one cut contains 1,000,000 yards, which it is figured will be entirely removed by January 1913.

The Gravel Dredge at Eatons Point

Findlay Douglas, who has achieved some fame as a golfer, opened negotiations with Mr. Ewing with a view to laying out a links on the property, because of the excellent natural hazards and sand traps which the location afforded.

On returning to the boat, it was found the waiters had taken advantage of our absence and prepared the table for another spread that made everyone forget temporarily his regret that the outing would soon be over. President Emil Diebitsch expressed the unanimous sentiment of the crowd in a few well chosen words of appreciation of the Goodwin Company's lavish hospitality, and "Host" Ewing said he was already planning some more features for the fourth annual outing next year, all of which listened good to the hard working contractors present and promises them at least one day of rest in 1913.

LOYALTY

If you work for a man, in Heaven's name WORK FOR HIM. ¶If he pays you wages that supply your bread and butter, work for him; speak well of him; stand by him and stand by the institution he represents. ¶If put to a pinch, AN OUNCE OF LOYALTY is worth a pound of cleverness. ¶If you must vilify, condemn and eternally disparage, why, resign your position, and if you are a weakling when you are outside damn to your heart's content. But as long as you are a part of the institution do not condemn it. ¶If you do, you are loosening the tendrils that hold you to the institution, and the first high wind that comes along, you will be uprooted and blown away, and probably you will never know why, as many have experienced.

BENJAMIN C. WARNICK

Methods Used by the Walsh-Kahl Construction Co., in Four Tracking on the New York Central & Hudson River R. R.

ON the Hudson Division of the New York Central & Hudson River R. R. where considerable double tracking work is in progress, the Walsh-Kahl Construction Co. are using a dump car train and Jordan spreaders to widen out shoulders sufficiently to lay a construction track so as to clear the present main line tracks. With a good locomotive and crew a train load of 150 to 200 cu. yds. of ordinary material can be leveled so as to clear passing trains in 8 minutes and can be leveled down to 2 ft. below top of rail in from 10 to 15 minutes.

Owing to the high rock bluffs along the Hudson river running close to the river bank, the new main tracks are generally located on the river side, unless the shore water is quite deep, and any new embankment would be on a shelving rock as is the case sometimes which necessitates cutting into the rock cliffs for the additional tracks.

The old and new embankments are protected on the river side against wave wash, ice and tides, which ordinarily have a range of about 4½ ft., by a heavy course of rip-rap laid up near subgrade with a face slope of 1½ to 1; consequently the most practicable method of getting in a construction track is using material taken from excavation, which is mostly blasted rock, hauled on standard gage 12-yd. dump cars and unloaded from main tracks.

The spreader is usually coupled next to the locomotive in the train, and after cars are dumped and small wing and plow is used by placing between end of small wing and forward end of large wing a wooden block about 15 ins. long, suspended from side of spreader by a short chain to prevent block from falling out.

The purpose of the block is to hold the end of small wing out from the side of car so that in passing cars and spreader through the dumped material, the material will be pushed back from rail, and to a level with top of ties, sufficiently to clear steps of passing trains. Once through is generally sufficient, though where enough time is not available to use the large wing, which often is the case on account of the many freight and passenger trains on this division, a second pass is sometimes necessary to insure good clearance. The dumped material is then spread at a later time when there is a chance to use the main tracks. This procedure does not require the use of the large wing and can be accomplished in six to eight minutes.

Should there be sufficient working time, that is, twelve to fifteen minutes, the spreader is uncoupled from train after being moved ahead of dumped material, and the dump is spread to the full working depth of spreader below top of rail. The locomotive and spreader are again coupled to train and proceed for another load. Owing to the frequent trains no more material is unloaded from main tracks than absolutely necessary to make room for a dump track.

The expense of a separate locomotive and crew to operate spreader would not be justified under the working conditions.

There have been different kinds of these machines used, from the crude types gotten out by numerous railroad shops throughout the country, and which were very slow and uncertain in their operation, to

70-C Bucyrus Shovel Starting in on the Work

Entering the Rock

the modern all-steel Jordan spreader operated entirely by air, in which all movements of the wings whether vertical or horizontal are accomplished by means of large air cylinder with suitable piston and lever connections.

Briefly the spreader consists of two large horizontal wings, one on either side, hinged to a perpendicular post carried between two guide posts securely fastened to the side frames of an ordinary flat car body, and arranged so wing can be raised or lowered to suit work to be done.

As the inner end of large wing in working position clears ends of ties about ten inches there is placed just ahead and on either side a small wing hinged to an apron-like frame or plow enclosing

Coming Around the Curve

The Jordan Spreader Makes a Perfect Job at One Operation

The 70-C Bucyrus Digs the Rock With Ease

the forward end of car, the purpose of which is to move any material on the track out to a point where the large wing can carry it on and outward over the embankment.

This apron or plow has a range of operation from a few inches above top of rail to the top of ties, while the large wings can be adjusted to work from about 17 ins. above rail to 2 ft. below, and 15½ ft. to 22 ft. from rail to edge of embankment.

The movement of the wings is readily controlled by the operator by means of suitable air valves, the air being taken from a reservoir on the machine which is supplied by the air pump from the train line.

The Jordan spreader is adapted to successfully handle all kinds of materials, from loose earth to

large bowlders and blasted rock. In handling material of the latter class some care is necessary in operating the spreader to avoid damage in bending the large wings or the braces supporting same. Frequently large pieces become imbedded in the fill in such a way that the wing will raise and slide over them without moving them over the embankment. In such cases a few dump men with shovels and bars can raise these pieces to the surface where the spreader can readily dispose of them without further trouble.

One man is sufficient to control all necessary movements of the spreader, though on main line work where quick work is required, a helper is advisable.

The output on an earth handling job is more often determined by the methods and capacity for disposing of material taken from a steam shovel than by the digging capacity of the shovel.

Where such are the conditions and material is to be unloaded from main tracks or dump tracks or high fills, or where the excavated material is of such nature that dump tracks cannot be kept safely near edge of fills, the spreader is almost indispensable.

The cost per day of a spreader may be estimated as follows, assuming all items liberally to insure their covering the cost in any case:

Depreciation on $5,000 machine at 15 years life, 250 days per year	$1.33
Interest at 5 per cent	1.00
Repairs at $50 per year	0.20
Labor, 1 operator	2.50
Oil, waste, etc	0.10
Total	$5.13

This will indicate what may be the cost of using a spreader. If the machine is taken care of it should be sold at the end of 15 years for a reasonable price but no account is taken of the scrap value in this estimate.

The machine can easily handle all material which can be supplied by trains which might be anywhere from 1,000 to 20,000 yards per day. The cost per yard for spreading is therefore almost negligible, whereas by any other method it would be a serious item.

A Proclamation

By the President of the United States of America—Panama-Pacific International Exposition

Whereas, in conformity with the conditions and requirements of the joint resolution of Congress approved February 15, 1911, "Authorizing the President to invite foreign countries to participate in the Panama-Pacific International Exposition in 1915, at San Francisco, California", satisfactory proof has been presented to me that a suitable site has been selected for the said exposition and that the sum of not less than fifteen million dollars will be available to enable the Panama-Pacific International Exposition Company, a corporation organized and existing under and by virtue of the laws of the State of California, for the purpose of inaugurating, carrying forward, and holding an exposition at the city of San Francisco, California, in the year 1915, to celebrate the completion and opening of the Panama Canal;

Now, therefore, I, William Howard Taft, President of the United States of America, by virtue of the authority vested in me by said joint resolution, do hereby declare and proclaim that such International Exposition will be opened in the year 1915, in the city of San Francisco, in the State of California, And, in the name of the Government and of the people of the United States of America, I do hereby invite all the nations of the earth to take part in the commemoration of an event of great interest and importance to the world by appointing representatives to the Panama-Pacific International Exposition and sending thereto such exhibits as will most fitly and fully illustrate their resources, their industries, and their progress in civilization.

In testimony whereof I have hereunto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington this second day of February, in the year of our Lord, 1912, and of the Independence of the United States of America the one hundred and thirty-sixth.

(SEAL.)

By the President: WM. H. TAFT.

P. C. KNOX,
Secretary of State.

An Argument

You're crazy in your A-frame head,
One shovel to another said,
The other said why, you can't holler,
Look at your dirty A-frame collar.

I don't see why you made that whine,
Your A-frame shoes, they need a shine,
And when you come, out of your nap,
I suggest you brush your A-frame cap.

You're off your base, and your A-frame legs,
Reminds me, friend, of scrambled eggs,
And I hope next time, if we should meet,
You'll have no rust, on your A-frame feet.

—By R. Fletcher.

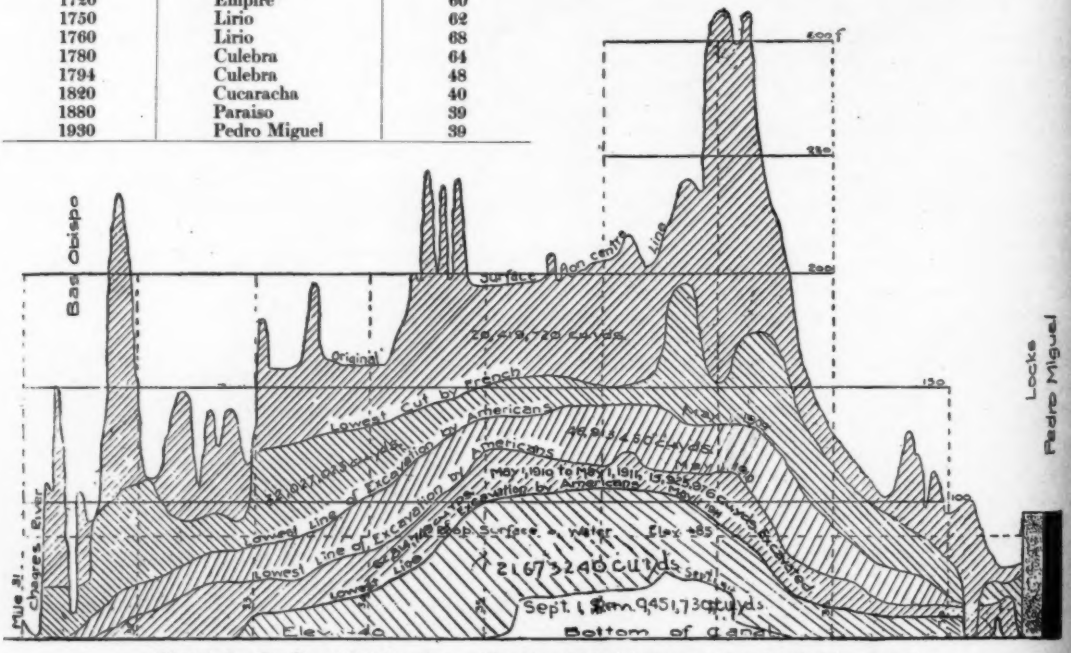
The Work in Culebra Cut

On October 1, the excavation required for the completion of the Culebra Cut, in the Panama canal, amounted to approximately 8,300,000 cubic yards. Up to date approximately 85,400,000 cubic yards of material has been removed from the cut. Practically all of the excavation remaining to be done lies within a distance of about five miles, between the new bridge at Paraiso and La Pita slide, north of Empire. Beyond the ends of this section the work to be done is the removal of inclines, and of material at the foot of several small slides. One of these slides is at Whitehouse yards, on the west bank, and another is almost opposite at Station 1631, where the Obispo Diversion dike settled in June 1912. The accompanying profile, Fig. 1, which with the information here given, is taken from the Canal Record, shows the distribution of excavation to be done between the dike at Gamboa and Pedro Miguel Lock The following table of elevations of pioneer cuts indicates the status through the unfinished part:

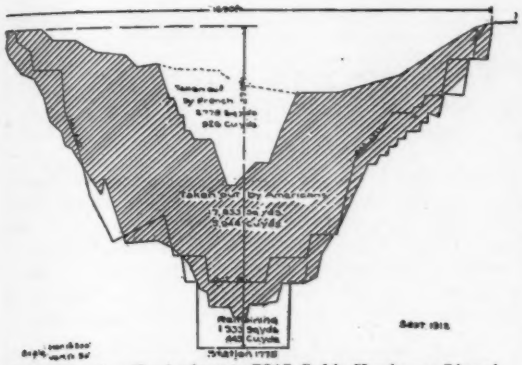
Station	Near Village	Elevation
1630	Las Cascades	39
1680	Empire	39
1692	Empire	44
1700	Empire	58
1720	Empire	60
1750	Lirio	62
1760	Lirio	68
1780	Culebra	64
1794	Culebra	48
1820	Cucaracha	40
1880	Paraiso	39
1930	Pedro Miguel	39

The elevations of pioneer cuts are not a complete index, nor one that can be interpreted uniformly, because of breaks and slides along the channel embankments. Over twice the amount of material yet to be taken from the channel to complete the cut has already been taken out from slides, and about 45 per cent of the excavation remaining to be done is due to them. Figure 2 shows a cross section of the cut at Station 1178, opposite Culebra, with heavy slides on either side. It will be noted that the banks have broken back until the width across the top of the cut at this station is 1690 feet. Had the material allowed a continuous 1-on-1 slope of the banks, the width at top of a 300-foot channel, carried 270 feet below the original surface, would have been 840 feet, with proportionate decrease in excavation. The action of the slides is indicated further by the crossing of the lines showing sections in October, 1911, and September, 1912.

Because the development and extent of slides cannot be accurately estimated, excavation through the cut will be prosecuted with vigor to obviate contingencies. The number of steamshovels at work, which has averaged about 37 since the beginning of the present rainy season, is shortly to be increased to 41 or 42. It is planned to have the dry excavation finished by July 1, 1913. Shortly after that, water will be let into the cut through the dike at Gamboa, and the ladder dredge Corozal is to be



Sketch A.—Profile of Culebra Cut. (Showing Material Excavated and to be Excavated).



Entire Section Equivalent to 7315 Cubic Yards per Lineal Foot of Canal Prism.

brought into the cut from the Pacific entrance, to work at the foot of any slides which continue to develop, in addition to removing the dike and cleaning out about 150,000 cubic yards of silting in the completed channel between Gamboa and Mamei.

The slides call for no other treatment than unremitting excavation. The plan for excavating at the top, however, has reduced the size of the slides and restricted their menace. Following heavy rains on Septemner 21, 1912, the slides at Culebra, shown in Fig. 2, pushed out at the toes. One of them partly buried two steamshovels, and closed the pioneer cut for a distance of 50 feet. Experience leads the engineers in charge to believe that if the tops of these slides had not been previously lightened by excavation, the movement would have been sufficient to bury all tracks and close the cut from bank to bank. Excavating at the top will be continued on all large slides.

REVIEW OF BOOKS and CATALOGS

We shall be glad to review in this column such books and catalogs as are sent to us. Books reviewed in these columns will be supplied by The Excavating Engineer Publishing Company at the prices named.

Economics of Contracting by Dnaiel J. Hauer—5½" x 8½", 269 pages—cloth bound. Mr. Hauer's argument that "contracting is a profession" and as such should be taught in the technical schools of our country seems to be well founded. Students of "contracting" would at least be as well equipped for the pursuit of this work on leaving college as are "engineering" students and contracting carried on in an intelligent way is a very profitable business.

"Economics of Contracting" should be studied rather than read or referred to as it treats the subject in a manner that is sure to bring profitable returns to those who follow this suggestion. It is really a text book of great value to the young contractor and a study of its contents would greatly assist in avoiding expensive mistakes in carrying on such work. Price $2.50. E. H. Baumgartner, Chicago.

Hand Book of Cost Data—5" x 7", 1854 pages. Second edition, morocco cover, by Halbert P. Gilette. The author has sought to and admirably succeeded in putting into this volume the cost data so frequently needed by the engineer as well as the contractor. The engineer needs frequently to ascertain the number of units in a structure of a given size and class as well as the cost per unit, while the contractor usually requires only the data giving the itemized unit cost under certain conditions. Mr. Gillette's book covers the requirements of both. The data is carefully classified and arranged and thoroughly well indexed, a feature not always present in books of this class. Published by The Myron C. Clark Publishing Co., Chicago. Price, $5.00.

Concrete Construction by Gillette & Hill—6" x 9", 690 pages, cloth bound. This book is a treatise on the methods and cost of concrete construction handled solely from the viewpoint of the builder of concrete structures. It is a book of particular interest to the contractor and engineer on the job but should also prove highly useful to the designing engineer and architect. It contains a large number of detail drawings of construction plants, methods of handling the falsework and ingenious schemes that have been successfully employed in actual work. Price, $5.00. The Myron C. Clark Publishing Co., Chicago.

Engineers Pocketbook of Reinforced Concrete—4¾" x 6¾", 364 pages. morocco cover. By E. L. Heidenreich. While this book gives a vast amount of data and many formulae of great value to those engaged in concrete work we believe it would be greatly improved as a "pocketbook" if it were printed on thinner paper. Price, $3.00. The Myron C. Clark Publishing Co., Chicago.

Buffalo Pitts Co., Buffalo, New York—Catalogue 12 x 9", 40 pages. This book illustrates and describes the different products of this company, embracing steam tractors, patent reversible stone spreader cars and trail cars. The Buffalo Pitts road freight cars and contractors side dump cars are also illustrated and described.

St. Louis Cordage Mills, St. Louis, Mo.—"Trojan Transmission", 5¼" x 7¾", 32 pages. Deals with the question of rope transmission of power for all mechanical purposes. Full of interesting facts and nicely illustrated.

Macomber & Whyte Rope Co., Chicago, Illinois—catalogue 6¾ x 10', 72 pages. This catalogue illustrates and describes the various brands of wire rope made by this concern, together with miscellaneous fittings used in connection with contractors service.

William B. Pierce Company—Treatise on Scale Remover vest pocket size, 3 x 6½", 46 pages. Gives some very interesting things regarding the removal of scale from boiler tubes.

The Milburn Wagon Co., Toledo, Ohio.—Catalogue 6¾" x 9", 20 pages. Describes and illustrates their dump wagons for contractors service. The details are splendidly illustrated.

Universal Cement Co., Chicago, Ill.—Farm Cement News, Oct. 1912, 6" x 9", 32 pages. A quarterly publication illustrating innumerable ways in which cement may advantageously be used on the farm. This number especially interesting. Sent free.

The Mixer—This is a monthly publication issued by the Koehring Machine Co., from their general office at Milwaukee, Wisconsin. It is 4⅛ x 8", 16 pages and refers to the handling of cement work. Sent free on application.

Small Farm Buildings of Concrete.—6 x 9", 160 pages. This publication is issued by the Universal Portland Cement Co., of Chicago, Illinois, and as is suggested by its title, gives a vast amount of information regarding the construction of farm buildings from concrete.

The Baker Mfg. Co. 337 W. Madison St., Chicago, Ill.—Pamphlet 33-4 pages describing road making and street cleaning supplies.

Steam Shovel Work

A treatise, from the practical viewpoint, relating to the problems involved in steam shovel operation.

By Construction Service Co.

I cannot too strongly emphasize the importance of selecting the most skillful shovel runners and cranemen. The loss of money caused by indifferent ability in these positions may easily be several times as much as the wages of the men themselves.

I will elsewhere show the economic effect of efficiency in moving the shovel. For this reason the pit crew should be made up of picked men, one of them getting a little more pay than the others perhaps and having authority over them. Thorough organization here may be worth half the wages of the pit crew. Of great importance in many classes of work is the dump gang, which usually receives but scant attention. In sandy material there should be no difficulty in dumping the cars with great regularity and returning them to the shovel on time, but with clay mixed with boulders a good dump foreman and a lively gang are necessary for good work. The men must realize that they are a part of a large machine and that their own delays will impede their fellow workmen. For this reason it is often well to alternate the foreman and some of the men between the different positions. A foreman on the dump will better realize what is expected of him after he has had experience in the pit and on the track laying. Some of the more intelligent men will also be benefitted in like manner, while others of less intelligence will not.

The kind of material greatly affects the shovel output, as will be seen from the reports which will be given later. Rock work will generally cost much more to load than earth, and rock that is badly broken may cost three times as much to load as properly blasted rock. In this case, its condition, which affects the cost, may be due to the degree of skill used in the preceding process. Clay will vary much in consistency and in the ease with which it can be handled. The higher the face to which the shovel can work, the greater the efficiency, as will be indicated later, if conditions are equal. The safe height of bank, however, is limited by the material, heavy slides being dangerous. Some banks are too high to be economically workable on account of slides.

For purposes of estimating, in order not to forget anything and to facilitate a logical arrangement of the various costs that occur on the work, it is important to have some standard classification of expenses. The ordinary costs are included in the list which will be given later on in this article, and will be useful as a guide to properly subdivide the cost keeping in the field, and as an aid to the bookkeeper. By using the symbols opposite each name they can be easily and readily referred to. It has been found that the mnemonic method is much easier to remember and more satisfactory in operation than a numerical system. It has been used for some time and is giving general satisfaction.

To set before the man interested in steam shovel work the necessary data to enable him to work out the economies of his shovel work at the least cost is the problem that we have attempted to solve in this article. There are so many factors entering into the work that the problem seems at first highly complex; but systematic analysis has resulted in so simplifying it that any man of field experience ought to be able, with the help of the data which we shall submit to put his shovel work on a scientific basis. To determine what work is costing day by day is half the problem; to determine what it ought to cost is the other half.

To establish these factors it has been necessary to observe a large number of shovels in operation, and an elaborate description of the work observed will be necessary in order to afford an adequate statement of the result.

Wherever possible, the observations have been made by our men. On questions of coal and oil consumption and the like we have had to take the statements of shovel runners, checked more or less by our own observations, and in the items of repair cost, etc., we have had to rely on the statements of others. Where such statements have seemed not to be accurate, we have discarded them.

The process of loading consists in sifting the material after it has been reduced to a fit condition and placing it either in its ultimate position or upon a vehicle for the purpose of transportation. With hand shovels, unless the material be sand or gravel or very soft loam, it is essential that it be broken in order that the workmen may be able to handle it. With a steam shovel, however, much of the breaking can be done by the power of the shovel itself aided by teeth which are fastened to the dipper, so that, in many instances, rock which has been imperfectly blasted is further reduced by the crushing and tearing up of the teeth driven by the steam power of the shovel's mechanism. The steam shovel then is frequently called upon to perform not only its proper function of loading, but to a large extent the other process of breaking the material.

*Continued from page 58, November issue.

(To be continued)

The Excavating Engineer
[FORMERLY STEAM SHOVEL NEWS]

A Monthly Publication Devoted to Excavating *and* Allied Subjects

Contributions bearing upon the practical aspects of the above work are solicited, and if accepted will be paid for at the usual rates.

Subscriptions, payable in advance, $1.00 a year for 12 numbers, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii, or the Philippines; $1.50 in Canada.

To foreign countries, including postage, $2.00 or its equivalent, 8 shillings; 8 marks; or 10 francs.

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Advertising copy should reach Milwaukee Office by 10th of month, before date of issue.

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THE EXCAVATING ENGINEER PUBLISHING CO.
Frank G. Bolles, Manager *and* Editor — 267 National Avenue
Bradley Van Brunt, Assistant Manager — Milwaukee, Wis., U. S. A.

Col. Geo. W. Goethals

Our frontispiece for this issue is the portrait of Col. Geo. W. Goethals, Chief Engineer and Chairman of the Isthmian Canal Commission.

As the gigantic task of digging the Panama Canal nears completion the personality of the man who has been both Engineer in Chief and Executive head of this great work comes more and more into prominence.

During the six years which Col. Goethals has directed the work at Panama there have been many perplexing problems. All of them have been satisfactorily and successfully solved and the work has rapidly progressed to a point where there is no hesitation in announcing the completion of the Panama Canal during 1913, two years in advance of scheduled time.

The hugeness of this work is quite beyond comprehension of the average mind. The volumes of earth and rock excavation and the cubic yards of concrete involved in the dams, locks and spillways are so great that the lay mind cannot fully grasp their meaning without conparing with some well known structures. In this connection the Scientific American of Nov. 9th is very largely devoted to an effort to convey to the general reader what the figures mean. What this publication has done is helpful to a better comprehension of the work but is still far from satisfactory as a means of enabling one to fully and clearly understand what has actually been accomplished.

Suffice it to say that in the rapid and successful completion of the work of building the Panama Canal, Col. Goethals has earned the position of and should be recognized as the Dean of the Corps of Engineers of the World.

It is not improbable that he will be selected as Governor of the Canal Zone. It would be a most logical conclusion and would provide an executive for the administration of the affairs of this important section of our country having unequalled qualifications.

American Society of Mechanical Engineers to Meet in Germany

On Saturday June 11th, 1913 members of the A. S. M. E. will sail for Germany arriving in that country on June 21st. On arrival they will be shown through one of the great German shipyards after which they will go by special train to Leipzig where on Monday June 23rd the formal opening of the 54th Annual Meeting of the Verein Deutscher Ingenieure will occur.

The King of Saxony and the municipal authorities of Leipzig will welcome their coming at this opening and two addresses will be made, one by a member of the Verein Deutscher Ingenieure and another by a member of the A. S. M. E. Tuesday, June 24th, will be devoted to several technical papers and a patriotic gathering in commemoration of the 100th anniversary of the Battle of Leipzig.

On Wednesday the delegates will start on a tour of industrial Germany according to the following schedule:

June 25, A. M. Dresden.
June 27, 28. Berlin
June. 29. Dusseldorf. Reception by the Rhine Westphalian Section of the Verein.
June 30 to July 2. Various functions arranged by the Rhine-Westphalian Section, including a trip to Cologne and Essen.
July 3. By railway to Bonn. By boat up the Rhine with festival at Rudesheim. By rail to Frankfurt, a/M., arriving about 6 P. M. Evening—reception of welcome at Frankfurt.
July 4. Independence Day at Frankfurt.
July 5 A. M. Nurnberg.
July 6 P. M. Munich—Evening reception of welcome.
July 7, A. M. Visit to the German Museum.
July 7, P. M. Trip on the Starnberg lake. Evening. Final exercises in the Rathaus.

In all probability the great Krupp works at Essen will be thrown open to the party and the

Baroness von Bohlen (formerly Miss Krupp) will receive the American engineers in person.

The trip up the Rhine from Bonn to Rudesheim will be made by boat and at Rudesheim there will be a grand festival on the embankments. Independence Day will be celebrated at Frankfurt, a/M. under the auspices of the American Embassy.

The final meeting will be held in Munich, July 7, in connection with the Museum of Technical Arts, of which Dr. von Miller is the Director. It is expected that the Prince of Bavaria and the Mayor of Munich will also receive the party. The entire trip through Germany and the various official receptions are being arranged by a Committee of the most important men of the Arts and Sciences in the German Society and there is the keenest interest shown by municipal authorities and the heads of industrial establishments.

Mr. Conrad Matschoss, Dozent of the Royal Polytechnic High School of Berlin has been visiting the United States as a representative of the German Society and has been conferring with the Committee of Arrangements regarding itinerary, professional papers, etc.

Business Forecast

It was just a year ago that business emerged from the uncertain and unsatisfactory condition in which it had struggled for two years. The business of the years 1910 and 1911 was unsatisfactory in the extreme as even the most far-seeing business men did not know what to expect. A year ago today the business interests began to see light and predictions were freely made that the year 1912 would be a much more satisfactory business year in spite of the fact that it was Presidential election year.

These predictions were borne out by a constant improvement in business which, starting at that time, has continued until now. The usual halting and hesitating due to political agitation has been almost entirely absent and business has improved step by step through the year, each month being better than its predecessor.

We have now arrived at a stage where we shall see the "survival of the fittest". All business combined will probably show a continuation of the present satisfactory activity but in certain lines there will be some deterrent factors. The prospect of a special session of Congress to revise the tariff downward would naturally have an effect upon those lines in which tariff changes are expected.

Although the number of Business Failures for October was greater than the previous month and exceeded October 1911, the failures on the average were of smaller consequence and the total liabilities were 3 million dollars less than those of October 1911, and 5 million dollars below the failures of September of this year.

Bank Clearings for October were so much in excess of those of any previous October that it is hard to make a comparison. The total bank exchanges for October 1912 exceeded the showing made by any previous month in our financial history. January 1910 was the only previous month showing total clearings of more than 17 billion dollars. Exclusive of New York City, a new clearings record was set by October, the total being more than 7 billion dollars. The previous record was made last April at 6¼ billion dollars.

In the month of September, 462 railroads showed Gross Earnings of 272 million dollars, an increase of 20 million dollars or nearly 8% over the same month of the previous year. These same roads made Net Earnings of 97 million dollars for the month, an increase of 6 million dollars or nearly 7% over the same month in 1911. The notable part of this showing is that each separate group of roads in the various sections of the country showed an increase in gross and all the groups except the Southern group an increase in net for the month. The greatest increase in gross earnings was made by the Northwestern roads and the least by the Southern roads. The greatest increase in net was made by the Northwestern group and a decrease in net was shown only by the Southern group. The showings for both gross and net were new records for the month of September of any year. In October, 47 principal roads set a new record for gross earnings at 85 million dollars and the same 47 roads set a new record for gross earnings for the first ten months of the year at 696 million dollars. The gain for October over the previous October was more than 9 million dollars or 12%, and the gain for the first ten months of the year was nearly 54 million dollars or nearly 8½%. Heavy crop movement, unusually large shipments of steel and iron and a large coal tonnage account for the principal part of these increases. The railroad situation has decidedly improved.

A Car Shortage continues and much business is being lost as a result of the inability to make shipments. The Report of the American Railway Association under date of November 7 shows a net car shortage of 51,259, the greatest shortages being 43,800 box cars needed and 7,599 coal cars asked for.

October Exports totaled 255 million dollars compared with 210 millions for October 1911 and 229 millions, the former high record, made in December 1910. Imports for October were 178 millions compared with 133 millions for October 1911 and 163 millions, the former high record made in April 1912. Exports for ten months of the year totaled 1,871 millions and imports totaled 1,511 millions.

The October production of Pig Iron exceeded the figures of any preceding month and totaled 2,690

thousand tons as compared with 2,635 thousand tons, the previous record which was made in December 1909.

The unfilled Tonnage of Steel on the books of the Steel Corporation on October 31 was 7,594 thousand tons and this, added to the unfilled tonnage of the Independent Companies, leaves an actual tonnage unfilled for the Country of about 14 million tons. We must go back to 1906 to get any figures to compare with these. On September 30 and December 31, 1906, and on March 31 and June 30, 1907, the unfilled tonnage of the Steel Corporation was heavier than at present but that of the Independent Companies was much less so that the total amount of unfilled or unshipped orders to date is probably the largest the Country has ever seen.

Rail Contracts for October totaled 833 thousand tons and for the first ten months of the year, 4 million tons. More than 1,500 thousand tons of this amount is for 1913 delivery.

The output of Steel Ingots for October exceeded that of any previous month by 150 thousand tons.

The visible supply of Tin decreased during the month to nearly one-third less than at this time last year. The present supply of less than 11 thousand tons is the smallest visible supply shown since early in 1907. This year's production is estimated at 1 million tons or an increase of nearly 100% in production since 1908. The demand is still beyond the supply.

Copper exports for October totaled 25,000 tons and exports for the first ten months of the year, when the final figures are obtainable, will total approximately 280 thousand tons against 272 thousand tons for the same period in 1911. October copper production for this Country was about 140 million pounds and the visible supply increased to 77 million pounds for this Country and 173 million pounds for the World. The price is a shade lower.

October shipments of Anthracite Coal set a new record for the month and the last report shows more than 32,000 Coke ovens in blast, producing 400 thousand tons per week and shipments running 11,700 cars per week. Coal and coke prices are firm and the demand strong. Scarcity of labor is holding back the output.

The Production of Gold continues heavy and commodity prices during October remained at the high point for the year. A slight decline in average Commodity Prices in Europe forecasts a similar decline on this side and somewhat lower prices on many items are in prospect if not already realized. Grains and fruits are considerably cheaper and vegetables a shade below earlier prices. Prices on building materials, fuel, etc., have held up the average of all prices.

During October, 14 million Shares were traded on the New York Exchange, exceeding the previous month by 4 million shares and the corresponding month of last year by the same amount. The average price of a selected list of stocks showed a decline during the month of about a point and a half. The Bond Transactions for the month totaled 46 million dollars, exceeding the previous month by 1 million dollars but for October 1911 sales totaled 73 million dollars. The average of bond prices is a fraction of a point higher.

Building Operations for the Country showed a decline during September but made a material gain during October so that total building operations for the two months were about 5% greater than during the same period of 1911. The October gain was largely in Western cities although Eastern cities and Southern cities showed a slight gain. The Pacific Coast cities held their own, and New York City showed a falling off in building operations as compared with the same month of last year of more than 15%.

The summary of the Crop Situation is—Wheat, 720 million bushels, last year 621 millions; Corn 3,200 million bushels, last year 2,531 millions; Oats, 1,400 million bushels, last year 922 millions; Rye 35½ million bushels, last year 33 millions; Barley, 225 million bushels, last 160 millions; Buckwheat 19 million bushels, last year 17 millions; Flaxseed 30 million bushels, last year 19 millions; Potatoes 414 million bushels, last year 293 millions; Hay 72 million tons, last year 55 millions; Cotton (estimated) 14 million bales, last year 16½ millions; Tobacco 960 million pounds, last 905 millions. Apples and other fruits are nearly all record crops and practically all of the vegetables have shown an unusually large production.

Underlying Conditions are about all that could be desired, unusual activity being shown in almost every line. Considerable business is being lost because of inability to make deliveries. It is the old story of "unpreparedness". Although we had every reason to expect a great volume of trade at this time, few manufacturers were prepared for the business that has crowded in upon them. Insufficient manufacturing facilities, a real scarcity of labor, and in some parts of the Country, a serious car shortage, all are hampering the expansion of business, but even with these deterrent factors, business is tremendous.

There are a few conditions which are annoying and among these is the uncertainty regarding next summer's tariff action. A revision downward is expected on several important lines and its effect is already being discounted. It is the general belief that the tariff measure to be finally passed by the new Congress will be not far from the tariff bill recently vetoed by the President. Tariff changes cannot materially affect business until early in 1914 and the year 1913 will give a good account of itself.

Moving Drag Line

After a drag line excavator has been standing in one position for some time without being moved there is a tendency for the rollers to settle into the planks. This will make the moving of the excavator quite difficult and this condition is augmented by the collection of dirt and small pebbles beneath the rollers. It is also found in many instances that the planks will settle down at the point of contact with the rollers and the outer ends will raise which practically necessitates starting the machine up hill when moving it. When a drag line is found in this condition it will be a very difficult job to pull it ahead with a steady pull of the cable, in fact the cables are likely to be snapped because of the tremendous strains put upon them.

The proper procedure after having removed the chock and braces and the bucket has secured a good hold in the material ahead, is to throw in the clutch and then to slowly open the throttle until a good strain is obtained upon the cables when the clutch should be quickly thrown out. This will permit the machine to return to its former bearing and go a bit beyond and by again applying the strain on the cable at the proper moment the machine can be rocked back and forth on the rollers until the latter are clear of the rut at the point where they had settled into the planks. The machine will then move forward easily. This method has been found very satisfactory and is a great saving both in time and in repairs over the method of pulling straight away.

Shovel Brake for Cross Country Work

In moving a shovel across country, especially when the country is hilly, it is frequently necessary for the engineer in charge of the operation to use his ingenuity to overcome obstacles.

On E. C. Hill and Company's C. M. & P. S. contract, near Swift, Montana, an 85-C Bucyrus had to be moved nine miles across rough country. Inasmuch as there were no wagons available for carrying the boom and dipper handle it was necessary to move the shovel under its own power with the boom and dipper handle in place. Mr. Phillip Rouse who had supervision of this operation devised a clever scheme for braking the machine in going down the steep "coolies" and ravines whose grades averaged four per cent and over. Two thirty foot timbers were chained to the jack arms which were swung out. The friction these offered was found sufficient to supplement the shovel brakes and allow the shovel to descend the steepest hills encountered under pefect control.

Knocking and other Noises in the Engine

The causes of knocking or other noises in a steam-engine, causing anxiety to the careful engineer, may be generally traced by the ear, or by the feeling of the hand or fingers in contact with different parts where possibly loose joints may occur, and in obscure cases by a small stick of hardwood placed between the suspected point and the fingers or teeth.

Some of these causes may be enumerated, commencing with the cylinder-head. Water in the cylinder gives a peculiar sound—a rush and a blow—while the contact of solid pieces gives a click or thump the character of which a little experience soon reveals. Looseness in the piston-rings; looseness in the follower; rattling of nuts, set-screws, or springs used to set out the packing-rings, by being cast adrift in the chambers of the spider section of the piston, produce a constant click at every stroke. Other causes of noise are looseness of the rod in the piston through faulty fastening; looseness of the end of the valve-rod in the valve connection in the steam chest or in any of its joints, direct or through a rocker arm; looseness in the cross-head boxes and bearings, piston rod key, or lock-nut. Oval bearings, bound brasses, and side thrust should be examined, particularly the last named at the crank pin. Main journals on crank end of shafts may wear and have a thrust jar. Looseness in the side bearings of the fly-wheel key and a loose joint in the made up parts of a fly-wheel have sometimes been a mystery to find. Squeaking anywhere shows the want of oil.

Magnesium in Boiler Feed Water

One quart of oil to 3000 gallons of water, in the South Dakota field where much magnesia is carried in solution, was the only requirement for successful operation on the C. M. & St. P relocation near Andover, The oil was fed in by a connection to the injector feed pipe.

A method that has proved to be effective in keeping the steam piping leading to the hoisting engines from leaking is to place a ball joint vertically in the piping. It will take care of the expansion and contraction and give a degree of flexibility not otherwise readily obtainable.

Eveleth, Minn. A. O. Sisson.

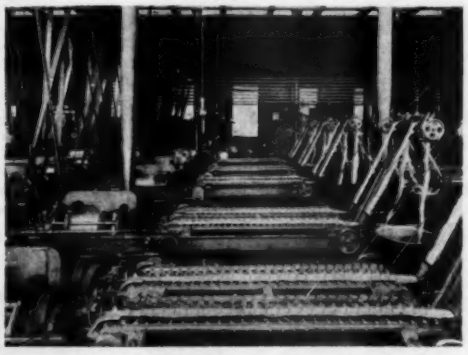
Think right; act right; it is what we think and what we do that makes us what we are. What others say of us matters little; what we ourselves say and do matters much.

The Manufacture of "Trojan" Manilla Hemp Rope

There is no vegetable fibre known that can compare with manilla hemp. There are many grades of manilla and substitutes for it which of necessity leaves the door of doubt wide open. Unless one is guided in the purchase of rope by well known "brands", which stand for quality on the part of the maker, the buyer can have no assurance of what he is securing.

"Trojan" Manilla Hemp Rope is made by the St. Louis Cordage Mills of St. Louis, Mo. This trade mark is an absolute guarantee on the part of the maker that rope sold under this name is made from the very highest grade of manilla hemp by expert labor and according to methods which their experience has shown to be best in producing a rope of lasting quality.

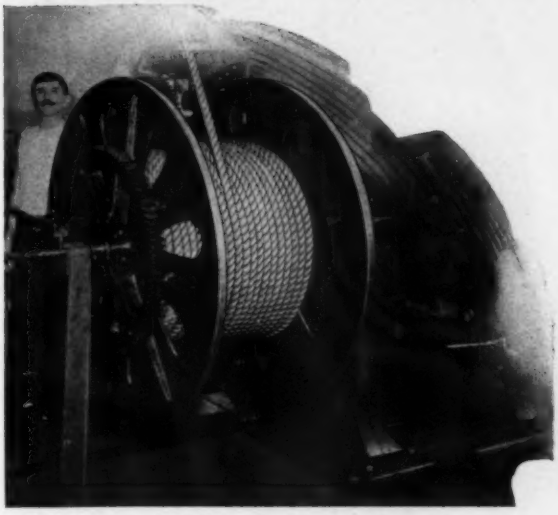
Manilla fibre is secured from the leaf stalks of a species of bananna plant called Abaca which is grown only in the Phillipine Islands. By crude native methods, still in force on the plantations, the fibre is separated from the stem tissue, then dried



Spinning the Individual Yarns from the Sliver.

and put up in loose bundles for shipment to the nearest market. It is there graded as to quality, baled and labeled for export to various rope manufactuers in all parts of the world.

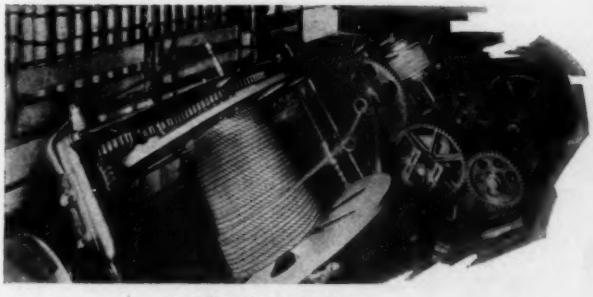
When these bales, which are protected in shipment by a crudely woven covering, arrive at the Receiving Department of the St. Louis Cordage Mills they are opened and the hanks of fibre delivered to the graders. These men, in accordance with the rigid standards of this company, carefully grade the contents of each bale, hank by hank, and only the longest and strongest fibres are used for "Trojan" quality. This hemp is fine in texture, a rich creamy color and almost uniform in length. The average length is about eleven feet.



Winding "Trojan" Rope on the Reel.

Patient skill and care goes into the preparation of the hemp. All tangles and tow bunches are eliminated and it is then treated with a special preservative compound and by repeated combings it is finally worked into the "sliver", each thread drawn out smooth, straight and even, and from this "sliver" the yarn is spun on the bobbins. The machines used in the spinning of the strands used in "Trojan" rope are so designed that the slightest defect in the "sliver" automatically stops them.

After the yarn leaves the spinning frames it is carefully tested for tensile strength, a constant fixed breaking strain being required for all of the yarn entering into this brand of rope. The system of inspection is very rigid and all material not fully up to requirements is rejected.



Laying "Trojan" Rope

The Completed Coil.

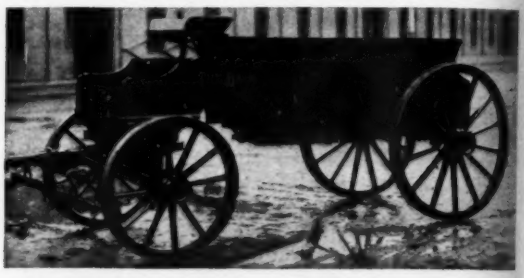
The yarn that passes inspection is now ready to be made into rope and the first step is the formation of the strand. A certain number of threads of yarn go to a strand, according to the size of the rope to be made, and these are twisted together in a left hand direction. Four of these strands are then twisted together in a left hand direction around a central core. The machines are so adjusted that exactly the proper degree of turn or twist is given to the strands.

In "Trojan" rope the core is thoroughly treated with lubricant as has also a certain proportion of the yarns in the strands. This lubrication is an important factor in the life of a rope as there is constant friction between the fibres and the strands slipping about the core. Thus, within a very short time the lubricant in the core of "Trojan" rope work up and out through the strands and permeates every fibre it contains and no further dressing is needed. It reaches the consumer fortified against all stress, wear or weather and will "stand up" under all conditions of service.

The Bain Dump Wagon

The subject of this article is the product of the Bain Wagon Company of Kenosha, Wis., a concern that has been building wagons for over half a century. They are comparatively new in the field of excavation but with the foresight of long business experience they first investigated the requirements of contractors and then designed and built a wagon to fully meet these requirements.

The running gear has hickory bed pieces reinforcing steel axles which prevents "springing". The wheels are the kind they have supplied for the past 60 years and have proved right in both design, material and construction. The doors are hung from loops instead of hinges giving free play after the load is dumped. A large drum on traverse shaft makes easy work of closing the doors and a pawl and ratchet wheel prevents accidental dumping of the load. One lever and one chain dumps and closes the doors. The beds are of white oak, strongly braced and the neck of the body is reinforced with two steel plates inside and outside, running back to first side straps. The seat is mounted upon full eclipse springs making it easy and comfortable riding for the driver.



Hundreds of these wagons have been supplied to the leading municipalities throughout the country for use in the construction of highways and sewers and are giving entire satisfaction.

A Practical Small Grinder

Contractors have long felt the necessity of a small grinder in practical form. The Luther Grinder Mfg. Co., of Milwaukee have placed upon the market a line of small grinders that satisfactorily fulfill the requirements of contractors service. The subject of this article is their grinder No. 1271 and 1455.

Electric Furnace in Heat

Luther Grinders are equipped with "Dimo-Grit", is one of the most wonderful sharpening substance known today. It is a manufactured product whose crystals are only equalled in hardness by the diamond itself. "Dimo-Grit" is formed in huge electrical furnaces. Here a heat of 7,000 degrees Fahrenheit is easily developed. It is this tremendous heat, which is so intense that it melts or vaporizes every known substance, that gives "Dimo-Grit" its un-

equalled hardness. Crystals from such heat are so hard that nothing will touch them. It is claimed that a grinding wheel of diamonds would be no better than one made of "Dimo-Grit". Our illustration shows an electric furnace after the current has been turned on.

Many other abrasives have been produced artificially, but "Dimo-Grit" is said to be harder and tougher than others. These other substances have all had one serious fault. They were well adapted for grinding down cast iron, for in that work it did not matter if a rough edge was left after grinding. This, however, would be fatal for the best results on steel tools.

Scientists and geologists say that the differences between "Dimo-Grit" and other high speed abrasives is in what they call "cleavage". It is this

No. 1271 "Dimo-Grit" Grinder

"cleavage" that makes it the better abrasive for steel tools. The cutting edges are refined and while other sharpening substances are inclined to tear the steel away, leaving the bevel of a blade slightly rough, this abrasive shaves it away in minute shavings and leaves a smooth mirror-like surface.

When "Dimo-Grit" is taken from the furnaces it comes out in large crystals. These are crushed and carefully graded according to size. The largest grains are made into wheels for extremely rough and fast cutting. From this point the grains are separated according to relative size and made into wheels and sharpening stones for different purposes. The grits range from extremely large crystals to powder so fine that it will float on water for a half-hour before it sinks. In this way it is possible to have grinding wheels or sharpening stones of exactly the right grit for any work, whether it be for heavy steel castings or for sharpening the finest razors.

The No. 1271 grinder is mounted upon a steel frame upon which is mounted a seat. The machine is driven by pedals much the same as upon a bicycle. Two grinding wheels are mounted upon the horizontal shaft and, if desired, a third may be mounted upon the end of the vertical shaft shown protruding from the top bearing. All gears are cut from the solid and run as noiselessly and smoothly as any machine can be made that uses gears.

No. 1455 in Vertical Position

No. 1455 in Horizontal Position.

The No. 1455 is designed to be mounted upon a bench or wall support and is so designed that the wheel may be tilted to any angle desired. The grinding wheel is double faced, one for roughing and the other for fine work.

The machines are all equipped with ball bearings and adjustable rests. You will find an inquiry and order card enclosed in this issue for your convenience in investigating. All goods are sold on the guarantee to return money in 60 days if not satisfactory which is the best assurance of quality.

Alabama

Stevenson—Mr. E. M. Eidy is now firing a Bucyrus 45-ton shovel for the Drexal Contracting Company at this point. John T. Warden is running and C. A. Arnold is craning the same machine.

Birmingham—W. M. Nichols, railroad contractor of Atlanta, Ga., has contract to construct several miles of the Louisville & Nashville double-tracking in North Alabama.

Mobile—The following bids, that indicated by (X) recommended for acceptance, were received by C. A. F. Flagler, Major Engineer, U. S. A., for dredging Mobile harbor to a depth of 27 feet; Home Dredging Co., Mobile, Ala., 7.72 cents; Atlantic, Gulf & Pacific Company, New York City, 7.89 cents; Bowers Southern Dredging Co., Galveston, Texas, 7.4 cents; Maryland Dredging & Contracting Co., Baltimore, Md., 7.4 cents; Coastwise Dredging Company (X), Norfolk, Va., 7.3 cents; and P. Sanford Ross, Inc., Jersey City, N. J., 8.1 cents per cubic yard.

New Castle—Mr. S. K. Flenor is operating a Marion Model 60 shovel at New Castle for the Ashville Construction Co. on their L. & N. work.

Birmingham—The Hardaway Contracting Co. one of the largest contracting companies of the South are having considerable trouble in getting labor for their work on Lock No. 17 on the Warrior River in Alabama. They have two years work on this lock and are advertising for carpenters, hoisting engineers and quarry foremen. They now have their office at Searles Ala., and a letter addressed to that place will reach them.

Birmingham—The Central Contracting Co. of Birmingham have just received a contract for taking out the excavation for the new branch plant of the American Radiator Co. at Birmingham. This work consists of about 30,000 yards. The above company will install a small revolving shovel on this work and work will begin in a few days.

Hartsell—Williams & Co. have just completed their work at Hartsell, Ala. on the L. & N. and are now moving their equipment to New Castle, Ala. where they have taken a piece of work under the Asheville Construction Co. This work is on the L. & N. and consists of about 50,000 yards. They will install a Model 20 Marion shovel on this work.

Arizona

Truckee—It is reported that the Southern Pacific R. R. Co. is planning to expend $10,000,000 in the construction of a tunnel 30,000 ft. long through the Sierra Madra Mountains, between Blue Canyon and Truckee, Cal. Robt. S. Lovett, 165 Broadway, New York City, is chairman of the Board of Directors of the Harriman lines.

California

Los Angeles—J. B. Wallace and Robert Eberts are running W. W. Brown & Co.'s Marion on the Southern Pacific double tracking at Blue Canyon, California, digging dirt, gravel and a few miles of snow. In another month it will be a few feet and they are promising if the vertical boilers don't freeze up, to beat the Bucyrus records on yardage. Here's hoping it snows.

Los Angeles—What do you know about this? Jack Sheahan had to have a new cinch made for himself since he quit working, the old one got too short on one end.

Los Angeles—At the present writing we have as guests in Los Angeles a very distinguished bunch of shovel men. Thos. Kane, B. S. Rowan, Jack Harriman, Krantz, Stevenson, L. Slagle, C. W. Elledge and Jack Sheehan. Some of them are assuming a far away look, if you want them, better act quick.

Los Angeles—W. Allerton, James Westbrook and Roy Lightneer are operating a little giant for James Montgomery just outside Los Angeles City limits in a gravel pit.

Los Angeles—A. B. Kellar is setting up a Model 20 Marion for A. W. Beesemeyer at Bakersfield, Calif. for street grading purposes and use in a gravel pit. Kellar has only been in the State five days. Is busy boosting already. Says if anybody leaves here it will be the natives.

Los Angeles—Bids were opened in Los Angeles recently by the Pacific Electric for about 85,000 yards of dirt excavation. Ten bids were submitted, contract not awarded.

Fresno—Bids are being received by City Clerk Ryan for the construction of a reinforeced concrete bridge across Dry Creek on Forthcamp avenue.

Los Angeles—The following bids were received by Lieut. Col. C. H. McKinstry, Corps of Engineers, U. S. A., for dredging in Los Angeles Outer Harbor, Calif.; F. C. Franks, San Francisco, Calif.; $0.4625; N. A. Jones Construction Co., Tacoma, Wash., $0.4675; San Francisco Bridge Co., San Francisco, Calif., $0.4325; N. R. Harris, San Francisco, Calif., $0.42; Standard American Dredging Company, Los Angeles, Calif., $0.339. There is available for the work $305.000.

San Diego—The contract for the construction of a 500 foot pier at Mission Bay park has been awarded by the O. B. Wetzell Company to Knight & Hyde.

Floriston—F. R. Keister is operating a 70-ton Bucyrus shovel for the Wasatch Construction Company, at Camp No. 1 near Floriston.

Midland—The citizens of this city are reported to favor the organization of the Central Canada Ry. Co. to construct a railroad between Montreal, Que., and Midland. Digby Horrel, Mayor.

Sacramento—Messrs. Leonhardt & Burchardt are operators on the No. 2 Class 24 Bucyrus drag line excavator owned by The Natomas Consolidated. This machine is at work near Brown's Landing on the Sacramento River California. It is building a levee which is intended to protect the Natomas property from inundations from the river, between Sacramento and Burnham.

Los Angeles—B. G. Karn is operating a type 0 Thew for J. A. Hill in cellar excavation. We would like to see Bro. Karn on a Bucyrus 14-B. It would take two papers, morning and evening editions to tell about the new records.

Colorado

Como—Walter Collenge has accepted a position running a Little Giant shovel for the U. S. Gold Reduction Co. Carl Bergreen is craning for him.

Georgia

Athens—The Seaboard Air Line Ry. (W. L. Seddon, Ch. Engr., Portsmouth, Va.) is reported to have decided to expend about $5,000,000 in improvements in the next 2 years, including extension of the system from Athens to Augusta, enlargement of yards and terminals, etc.

Pittsburgh, Kansas Items

Capt. Dan Miller of the Miller-Durkee Coal Co. will show you how to strip coal with a steam shovel if you will hike down to his field a mile or so below Scammon where he has turned the dirt upside down on 40 acres, which will give you an idea what this section of the country will look like when the coal strippers get through with it. The ridges of earth are as even as a row of houses placed side by side, this soil however is said to be fine for growing fruit after it has been weathered by sun and rain for several years. It would seem to be a good speculation to buy up a lot of this stripped land at a low price, grade the ridges down level with light revolving steam shovels which could be done cheaply and plant fruit tress or sell at a good profit.

Coal stripping operations are greatly stimulated by the advance in price of coal and active demand. The following prices are quoted F. O. B. cars at the mines in this district for November shipment:—

Shaker Screened Lump	$2.75	per ton
Shaker Screened Nut	2.50	"
Shaker Screened Slack	1.50	"
Mine Run	2.25	"

The coal stripping steam shovels are all working and four new ones are being erected. By the end of next month there will be 20 of them in active operation in the Pittsburg district. All of them have been put in operation within the past two years, which demonstrates conclusively the greater advantage and economy in strip mining as compared to underground shaft mining. The coal in this field averages 3 feet in thickness or 4,000 tons to the acre and from 10 feet to 30 feet in depth of overburden can be stripped with the new type of revolving steam shovels, at a low cost per ton of coal mined.

There are many thousand acres of good coal land available for stripping from 10 feet to 25 feet in depth of overburden which can be bought or leased and operated at a good profit, in fact the Kansas coal fields offer greater inducements for coal mining than any other section of the Country. The coal is of a good quality, being quite free from sulphur and burns freely with but little clinker.

The increased demand for soft coal is largely owing to the withdrawal of crude oil from the market also the failure of the natural gas supply both of which have been extensively used on the middle west and southwest by railroads and manufacturers. We know of one Portland Cement plant alone, formerly operated with natural gas, which is now using from 400 to 500 tons of soft coal per day and there are many others. In Missouri, Kansas and Oklahoma there are a large number of Brick Manufacturing plants, some of them very large, making vitrified paving brick and building brick in great varieties which have been using natural gas or crude oil for fuel, now they must use coal, which amounts to millions of tons yearly all of which is evidence that the coal business is flourishing with good prospects for the future.

The erection of two of the big 175 ton Bucyrus coal stripping steam shovels for Smith, Scott & White, Contractors on the Weir field, two miles east of Dhicope is completed and the third one is now being set up. Frank Wilkinson erecting engineer of the Bucyrus Company is in charge.

Packard and McWilliams, who have been stripping coal for the Practical Coal Company near Fuller, Kan., have bought the field they are operating and are now a full fledged coal company with Ed. D. Packard as Gen. Mgr. They have an extra good quality of coal and are selling it as fast as they can mine it. They are located on the Frisco R. R. about 12 miles north of Pittsburg.

The Sternberg Construction Co. who have been stripping coal with a Model 250 Marion steam shovel have recently sold their plant which is located about 3 miles north of Weir City on the Frisco R. R. to the J. R. Crowe Coal Co. who own the ground and will operate the steam shovel.

The Sternberg Company have recently purchased a tract of about 400 acres near Minden, Mo. about 8 miles northeast from Pittsburg and will proceed to develop it. They have organized the Sternberg Coal & Mining Company with offices at 815 National Reserve Bldg. Kansas City. This is a very promising coal stripping proposition, and the coal being of an excellen quality will meet with a ready sale. The Sternberg Company are reliable people and will merit a large patronage.

The Pittsburg-Scammon Coal Co. with offices in the Globe Bldg., Pittsburg are now operating their new 150 ton Bucyrus steam shovel on their field 2 miles south of Scammon. They are stripping dead coal which is used by the Zinc Smelters in reducing the ore. This Company have also installed a small revolving steam shovel carrying a ¾-yard dipper to load the coal into the train cars in the pit. We believe this method will prove successful and that shovels of this type will come into general use. Harry Miller is manager of the plant and R. H. French Secy. runs the office.

The Pratt-Durkee Coal Co. of Skidmore Kans., are stripping a fine vein of coal 4 feet thick with their Vulcan steam shovel, which is doing excellent work in 20 feet of stripping.

The C. H. Markham Coal Co. are stripping a fine piece of coal land at Curranville, Kans. about 10 miles north of Pittsburg. They operate a 150 ton Bucyrus steam shovel of the revolving type having a capacity to handle 2,000 cubic yards of the overburden earth and soft shale per day. The coal is of the best quality, the vein about 3 ft. thick and the overburden is from 15 ft to 22 ft. in depth. A geared locomotive is used to haul the coal from pit to tipple.

The Ellsworth-Klaner Company are operating their new Model 270 Marion steam shovel on the north Weir field about 2 miles east of Chicaope on a contract with the Central Coal & Coke Co. This shovel is of the revolving type with a 90 foot boom, a 5 yard dipper and will handle about 2,000 cubic yards of material per day of 10 hours. The object in putting in such a long boom shovel is to handle a greater depth of overburden, which may be 40 feet in depth.

W. S. Russell Traveling Representative of the Bucyrus Company has just returned from a trip to Cape Girardean, Mo. where he attended the letting of 42 million cubic yards of drainage ditch work by the Little River Drainage District of Missouri. This is the largest ditch project ever consumated and there was a great gathering of ditch dredging contractors, 50 or 60 of them in all to bid on the work, the final awards were not known when he left.

Mr. Sam N. Lee a well known Contractor of Kansas City was a guest at the Stilwell Hotel this week. He was much interested in looking over the coal stripping operations with the big revolving steam shovels which are of an entirely different type from the standard steam shovels generally used in railroad work. He met his old friend E. P. White who took him out to see their new 175 ton Bucyrus steam shovels on the Weir field.

E. K. Swigart, Vice-Prest. of the Bucyrus Company was a guest at the Stilwell Hotel this week. He came to look over the coal fields and become acquainted with steam shovel operations this being his first visit to this section of the country.

The Haynes Coal & Mining Co. of Arcadia, Kans. are operating a 95 ton Vulcan steam shovel stripping on a 120 acre field at Ardath on the Kansas City Southern Ry. The coal is about 34 inches thick and of extra good quality. Wm. Nostrant is running the shovel which is of the revolving type with a 55 ft. boom, a 2 yard dipper and is handling 1,000 cubic yards of earth material per day. The stripping is from 10 feet to 20 feet in depth.

The new 150 ton Bucyrus coal stripping steam shovel purchased by the Roy Millner Coal Co. of Weir City, Kansas is being installed about 1½ miles below town. John Elliott of the Bucyrus Company has charge of the erection. This shovel carries a 60 foot boom, 2½ yard dipper and will handle 2,000 cu. yds of earth per day of 10 hours.

St. Louis Items

By A. J. Michel

W. E. Tench & Co. Contractors, Detroit, Mich. can use Engineer for Thew Shovel. Write them there.

The Carmichael Construction Co. who have several Concrete Bridge Contracts on the Wabash R. R. between Decatur, Ill. and Montpelier, Ohio, report a shortage of men. Likewise on their Missouri contracts.

Hannon & Hickey, St. Louis Contractors were awarded the contract for building plant at Dallas, Texas recently.

$1,000,000 will be spent by the Frisco R. R. Co. for the erection of three bridges in the near future. One across the Arkansas River at Van Buren, Ark. and Tilsa, Okla., the third at Arthur City, Texas, across Red River. Several bridges of minor importance will be built at the same time. Chief Engr. Byers.

Any one in need of a Good Walking Boss, Team or Rock, will find P. H. Armstrong a capable man. His address is Monticello, Ill.

"One Wing" J. R. DeWitt is in charge of a large rock job at Cullman, Ala. It has been many years since J. R. has been around these "Diggings" and he will no doubt wonder with amazement when he does return at the many changes along "Labor Row".

C. S. Jones, Ivesdale, Ill. can use a 6 team outfit. Free transportation both ways on the Wabash R. R.

Anyone who can use a good 15 to 20 team outfit will not be dissapointed in writing M. L. Windham, Centralia, Ill., c-o Pittinger Hotel.

Several hundred Bulgarians and Greeks have passed through St. Louis the past two weeks enroute for Athens to aid in the war against the Turks. Like reports come from almost every City and no doubt there will be even a greater shortage of men this winter than is anticipated. 35 Bulgarians who have been working on a ditching and sewer gang close to St. Louis and earning $3.50 per day suddenly contracted the war fever and an offer from the Contractors of $5.00 per day was no inducements.

Thompson & Scott are making rapid progress on their Cotton belt Contract in Southeast Missouri. They have the contract for the entire work. Grading, tracklaying and surfacing. They also are just finishing the Cotton Belt Depot in North St. Louis. This is the last of a string of freight depots which has been recently erected in the Northern part of the City.

Jim Smith is driving piling for the new addition to the Anheuser Bush Brewery in St. Louis. He also has large contracts at Dallas, Tex. and Kansas City, Mo. They are better known as the Underground Construction Co.

A sidelight on the Labor Situation;—The most unique message comes from the Chief of Police at Pana, Ill. viz.:—

Please ship men who want work. Although you have shipped a hundred or more men for the Company here and they are offered work none will accept it. We have bums, beggers, moochers and holdups every day and night. Wonder what this Chief would do in a large City.

John Boyle an old time R. R. Foreman is taking life easy. Boyle has built Railroads and stripped quarries when steam shovels were in their infancy.

D. H. Donovan has secured the contract for building a number of coaling stations, depots, water tanks, etc., along the Iron Mountain Route in Arkansas and Louisiana that will keep him busy this winter. Mr. Donovan is one of the few very successful men in this line of work and usually finishes his contracts ahead of the contract time.

If you have work to let, need teams, have teams idle, etc., etc., send your news to A. J. Michel, 9 So. Ninth St., St. Louis. Same will be published in this paper in the next issue.

A. J. Michel and party of friends left here for a few days fishing in South Missouri. The trip was made in Automobiles. Only two breakdowns marred the entire trip. Among the party were Jim Smith, H. Weeke, P. Anderson, Nat Goldstein, Hy. Echterhoff and Frank McKee.

Kansas City Items

By M. T. Babb

Mr. William Kenefick has returned from Paris where he has been financing further extension of the M. O & G. Railroad. He has been successful in his attempt and work will go forward immediately. At this writing two extensions are in contemplation; one from Hernyetta, Oklahoma to Oklahoma City and the other from Dennison to Dallas, Texas. Just which of these will be built first is not known as yet. Mr. Kenefick's address is Bryant Building, Kansas City, Missouri.

L. J. Smith started West on the 14th inst., to look over his extension Santa Fe contracts. Mr. Smith has some very heavy work in progress at this time and more is in sight.

Jos. E. McGeer, one of the most popular labor agents that ever shipped a gang of "muckers" out of Kansas City or elsewhere, reports labor prospects as good. Joe received quite a jolt on election day due to the defeat of Mr. Taft but from last reports he is recovering nicely.

C. C. Fagan, shovel runner or Callahan Brothers died Sunday November 11th. He had been ill only a short time with Typhoid Fever. He leaves a wife and one sister. Burial was at Kansas City, Missouri on the 12th.

Mr. Frank Jordan, the popular machinery agent, reports the best year in his various lines that he has ever known and the best part of it is there is no let up in sight. Frank claims he is the man who coined the word "hustle" and we are inclined to believe he is correct in this idea.

Rumors are persistant here today that the St. Louis-Kansas City Electric Line is to go through this time without fail. There have been so many misrepresentations regarding this road in the past that we hope our readers will not put too much faith in this rumor. Still it comes from good authority and we may have something of interest to announce later.

Many of the leading Kansas City contractors were in Iowa this week looking over the C. M. & St. P. R. R. work to be let soon. At this time the successful bidder is not known but probably will be announced before this letter goes to press. There is over 2,000,000 yards of material in the contract.

Griffith & McMurray, Sharp Building, Kansas City, Mo., are just starting the construction of the C. & E. I. work in Illinois. Twenty-three miles are to be built by them and it is all new work. This is splendid team work and team men would do well to get in touch immediately with Griffith & McMurray at the above address.

Contractors having idle outfits and desiring work should communicate with M. T. Babb, Representative of the Western Wheeled Scraper Company, 503-4 Orear-Leslie Building, Kansas City, Missouri. Team outfits can be used on several contracts near Kansas City and full information can be had at the above address.

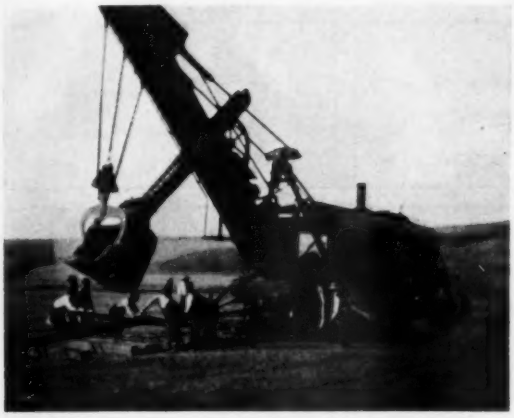
Mississippi

Lyman—The Homochetto Lumber Co., Monroe, Miss., it is reported, will construct an extension to run from Eddiceton to timber lands.

The Ingram-Day Lumber Co., Lyman, Miss., it is stated, will build a railway from its factory on Bayou Bernard to North Gulfport.

Greenville—The Riverside Drainage District awarded to Helleck & Thom the contract for excavating laterals in sections 1, 3 and 4 of the district which is all dry land work. Section No. 2, which is floating dredge work, was not awarded because of lack of proper bids. In the contract with Helleck & Thom there are 582,900 cubic yards, approximately, of excavation, and 15,000 cubic yards of levee building. The dredging company's bid was 13.2 cents per cubic yard, making a total of $81,000.

North Dakota



Laying the Ties and Rails Ahead of the Shovel.

Esmond—C. E. Jamieson, General Contractor of Stillwater Minn., is double tracking the C. M. & St. P. Ry. from Grand Falls to Montivedo, Minn. The views show herewith are reproduced from photos taken on the way from Esmond to the work. It was

All Ready to Move Forward.

necessary to move the shovel over fifteen miles of rolling prairie which was no small task. The job was accomplished without encountering any serious difficulties, however, and the shovel is now hard at work on the job.

Jamestown—The Midland Continental R. R., it is stated, has awarded a contract to Friedrick & Banard, Globe building, Minneapolis, Minn., for the construction of 50 miles of railroad north from Jamestown.

North Carolina

Whitney—The Southern Aluminum Co. are building a canal four miles long for developing a water power plant near this city. They have engaged on the work two 70-C Bucyrus steam shovels

and two Vulcan's, one 65 and the other 45-ton. We show in our illustration one of the 70-C machines ready to dig.

Class 24 Bucyrus Drag Line Excavator Operated by W. R. Bonsall at Weldon, N. C.

MAIL FORWARDING DEPT.	Field men may have their mail addressed in care of THE EXCAVATING ENGINEER and it will be promptly forwarded. Should no forwarding address be on file the names of those for whom we have mail will be published in this department.

Letter for J. W. Bright. (Please send us your address—*Editor*).

PROFESSIONAL DIRECTORY

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Wharf and Dock Construction.
River and Harbor Works.
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CHANCE, H. M.,
Civil and Mining Engineer
Drexel Building, Philadelphia.

John Mitchell, A. J. McDermott, A. M. McDermott.
McDERMOTT, MITCHELL & McDERMOTT,
Mechanical Engineers
708 Security Bldg., Los Angeles, Calif.

ARNOLD CO., The
Engineer-Constructors
Electrical-Civil-Mechanical.
105 So. La Salle St., Chicago.

CONSTRUCTION SERVICE CO.
Consulting Engineers
Experts on Methods and Costs. Cost Keeping Systems Installed. Plans and Estimates. Authors of Handbook of Steam Shovel Work.
15 Williams St., New York.

RANDOLH, Isham,
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Mem. West. Society of Engrs.
Consulting Engineer
826 1st National Bank Bldg., Chicago.

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Sanderstead, Surrey,
Code: McNeill, 1908. England.

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25 Broad Street, New York.
Cable: Farish. Usual Codes.

WEIS, S J.,
Dredging Engineer
De Keyser's Royal Hotel,
Embankment, London.

BUCKBEE COMPANY, J. C.,
Engineers—Managers
Chicago, U. S. A.
Purchase, Finance, Construct and Operate Crushed Stone, Gravel and Sand Producing Properties.

GARRISON, F. Lynwood,
Civil Engineer
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Cable: Arum. Code: Bedford McNeill

YORK GRANT & CO.,
Mining, Electrical and Civil Engineers
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FOR SALE

One model D Vulcan 50 ton Steam Shovel, 1½ yd. Dipper, standard guage, all M. C. B. equipment, price $2500.00.

Three model G Marion Steam Shovels, 2½ yd. Dippers, standard gauge, all M. C. B. equipment, $2500.00 each.

Nine 9x14 Porter 36" gauge Locomotive, price $1000 each.

The above equipment is in first class condition, all having been overhauled and is ready for work. Same is offered you subject inspection and prior sale.

Contractors' Machinery & Supply Co. Steuben & Carson Sts. Pittsburgh, Pa.

WANTED

We are in the market for a No. 0 or No. 1 Thew Full Circle Traction Shovel, second hand, ready for work; also, a hoisting engine with boiler, about 7x10 or 8x10 D. C., with two drums, second hand.

Juanita Construction Co.,
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You Need This Tool

Compact and Powerful

Because it will save time, trouble and annoyance in doing odd jobs in grinding tools or machine parts at a time when you need them. COMPACTNESS and HIGH EFFICIENCY are the special features of this

Dimo-Grit Grinder No. 35

THE gears and driving mechanism are contained within the wheel, so that it can be packed into a box scarcely larger than the grinding wheel itself. This is just the machine that contractors and shovel men have long needed for their tool chests. Surveyors, miners and many other classes can in this way have a perfect grinder with them all the time.

A series of three gears and three pinions, cut from solid steel blanks, give a high speed to the grinding wheel. All bearings are long and **run in the same casting,** which insures long life and perfect alignment. The entire gearing is enclosed and dust-proof. This feature of one-piece bearings is found only on Luther Grinders.

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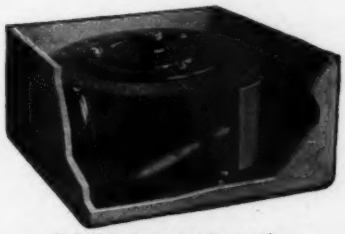
Weight, boxed, 10 pounds.

Price $5.00, and your money back in 60 days if not satisfactory.



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Milwaukee, Wisconsin U. S. A.

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FOR SALE or RENT for Immediate Delivery

Shovels—

One No. 0 Thew Full Circle with ⅝ yd. dipper, mounted on combination trucks, so that it can be used as traction or Railway wheels.

One No. 0 Thew Shovel out of factory only one year thoroughly re-built having been in railway wreck. Can not be told from new.

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One Little Giant 26-ton Traction Shovel, equipped with one yard dipper, and has extra large boiler, first class condition.

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One Lidgerwood Derrick and Plow manufactured by the Hicks Locomotive and Car Works.

We at all times carry machines in stock and same can be inspected here at any time.

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Milwaukee, Wis,

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1—No. 0 Thew Traction—2 yrs. old. Fine condition.
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1—No. 1 Vulcan Standard Gauge. Boom fitted to handle bucket as well as dipper. Used three months.
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1—70 ton Bucyrus. Splendid condition. With 2½ yd. dipper.
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1—95 ton Bucyrus. Splendid machine. 3½ yd. dipper.
And a great many others. Write for our bulletin.

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1—10 ton McMyler with 38′ boom.
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1—15 ton Interstate with 50′ boom.
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All of the above are equipped for handling two line buckets.

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9 x 14 Porters & Davenports good condition.
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1—25 ton Porter Saddle Tank Standard gauge.

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1—60′ boom Class B Lidgerwood-Crawford good shape.
1—60′ boom Monighan and some smaller ones.

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1 Class E 65-Ton, practically new.
1 Giant D 50-Ton No. 630.
1 Giant D Special 60-Ton.
1 No. 1 Revolving Traction.
1 L. G. High Crane Traction—in good condition.
1 10-Ton Loco-Crane.

BUCYRUS COMPANY
SOUTH MILWAUKEE, WIS.

WANTED

FOR SALE

1 MODEL 30 OHIO STEAM SHOVEL—1-yd. dipper, working weight 38 tons, in service 1½ years, is in good condition.

IOWA PORTLAND CEMENT CO., Earlham, Ia.

Copies of June Issue of Steam Shovel News

We would greatly appreciate copies of this issue which any of our readers happen to have on hand.

The Excavating Engineer Publishing Company
267 National Avenue Milwaukee, Wis.

FOR SALE—One three-quarter yard Traction Bucyrus Steam Shovel, practically new, equipped with two dipper sticks, one 14 feet long and one 20 feet long, and Alberta Steel Boiler.

STANDARD CONCRETE CONSTRUCTION CO.
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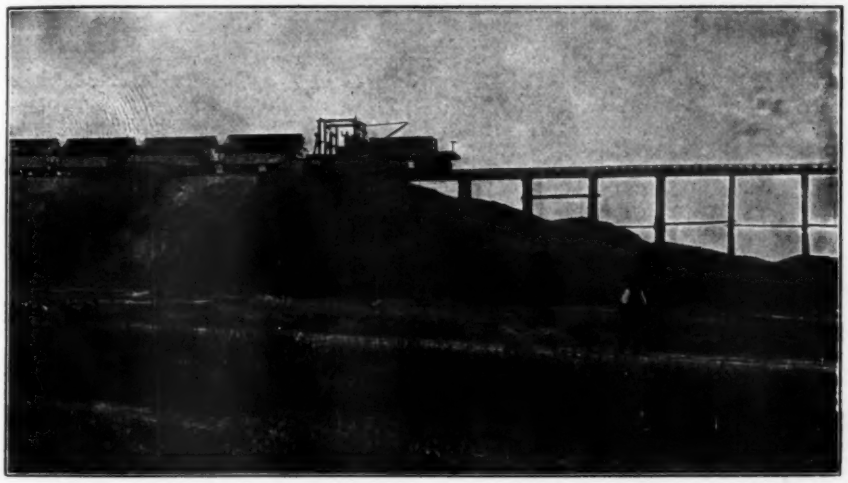
Reduce Expense on the Dump



By using Western Spreader Cars. Built amply strong for heavy work. The Standard gauge car will spread material 15 feet from rail and 12 inches below top of ties. Blades can be set at vertical angle so as to slope off embankment. Economical, efficient and durable.

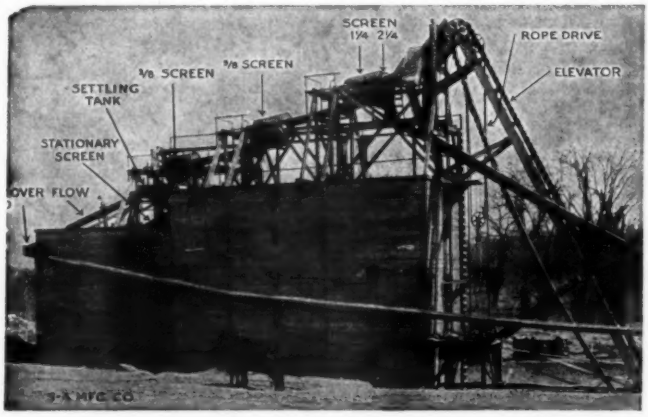
Western Narrow Gauge Spreader for use with 4-yard cars, is indispensable for economical work. Will save the labor of many men on the dump. Spreads 7 ft. from rail.

Western Wheeled Scraper Company

Earth and Stone Handling Machinery

Aurora, Illinois

Profits in Washed Gravel



This is a small gravel washing and screening plant, designed by us for H. D. Conkey Coal Co. Gravel is excavated by a steam shovel, delivered to a belt conveyor and thence to an elevator, which discharges into the screens. The screens wash and size the gravel and the sand is separated from the mud and clay in "S-A" Automatic Settling Tanks. Material is withdrawn from the bins direct to railway cars.

Every month the "Labor Saver" describes interesting installations like this. Let us put you on the mailing list.

In some localities, the profits in washing gravel are enormous. In all parts of the country, there is an increasing demand for this material for concrete work at good prices. The machinery for producing washed gravel is comparatively simple to install and operate.

Use Your Steam Shovel

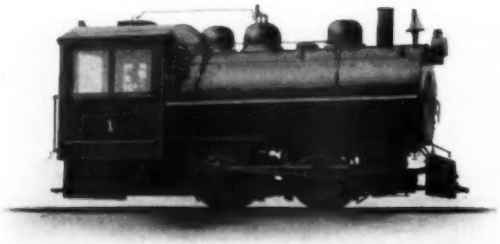
for excavating the gravel in the pit. This is the most expensive part of the equipment, and the washing plant provides a means of keeping the shovel busy. We can design the plant to suit the capacity of your shovel and to meet the demands of your locality and market.

Let us give you some pointers in this profitable business. Write.

STEPHENS-ADAMSON MFG. CO., Aurora, Illinois

LIMA LOCOMOTIVES

FOR CONTRACTORS' SERVICE



We build any type or class,—Dinkeys in all sizes, four wheel switchers, six wheel switchers and the Shay Geared Locomotive for extreme-heavy grade work. The Contractor of today, in order to be able to do his work economical, must have Locomotives suited to various conditions. We specialize on all classes and not only on one or two types. Our locomotives are of the most modern construction, built entirely in our own shops, and of the highest grades of materials. Guaranteed throughout.

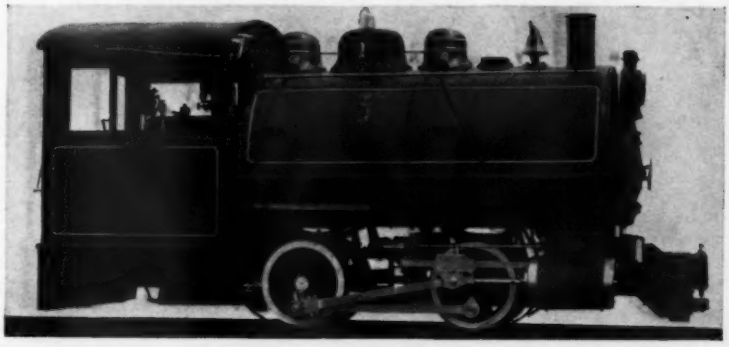
Write for More Information.

LIMA LOCOMOTIVE CORPORATION

LOCOMOTIVE PLACE **LIMA, OHIO**

GENERAL EQUIPMENT COMPANY

30 Church Street, New York City



Four 11″x16″ Cylinder, 36-in. Gauge Locomotives, Latest Design, as per Cut.

Steam Shovels, Locomotives, Cars, Concrete Mixers, Rock Crushers, Hoisting Engines, Derricks, Boilers, Air Compressors, Road Rollers, Etc.

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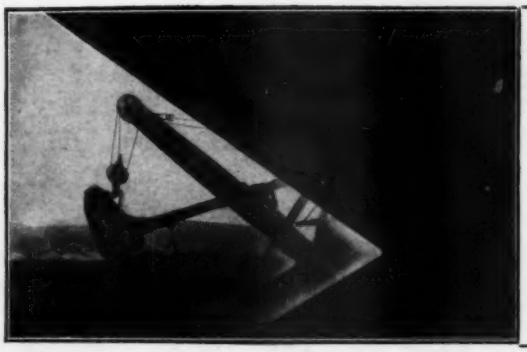

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Taylor-Mesaba Hoisting Chain

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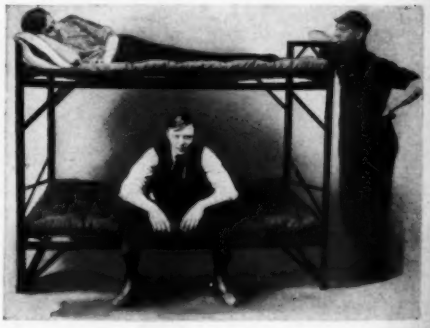
A Good Night's Rest
will add vim and vigor to your men. This can be accomplished by sleep
on the **"TIGER" STEEL BUNK**



It's built to stand all kinds of hard knocks. It's bug-proof. Made with wire-link fabric secured to the frame by oil-tempered helical springs. Cannot break down.

Write for descriptive circular and prices.

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is made of the longest, strongest Pure Manilla Fibres which can be procured.

¶ TROJAN is laid in either Graphite or Tallow, as may be preferred.

¶ We are in position to make immediate shipment of almost any length and diameter.

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¶ If interested in knowing more regarding the construction of this specially made 4-strand with center Rope, or if you have anything whatever to do with a drive, which some day sooner or later is sure to break down, send for our booklet describing TROJAN Transmission.

¶ Don't forget to ask for a free watch fob.

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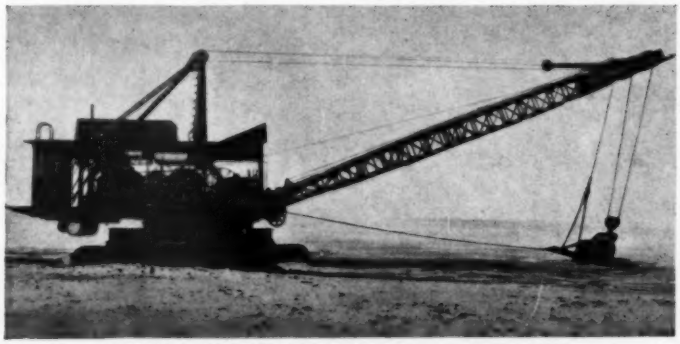
Drag Line Excavators

Driven by Steam, Electric or Gasoline. Mounted on Skids and Rollers, Trucks or Caterpillar Traction. Booms 50 to 150 feet long.

BUILT WITH THE STRENGTH OF A STEAM SHOVEL



Class 14 Bucyrus Gasoline Driven Excavator mounted on Caterpillar Traction. Self Propelling.

Caterpillar traction eliminates mud troubles, saves time and increases output. The excavator can be moved from one place to another with ease. It is ideal for jobs where the cuts are small and scattered.

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K-1-2

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No delay or annoyance when tracks are covered with mud or water.

Can be placed anywhere without regard to position of ties.

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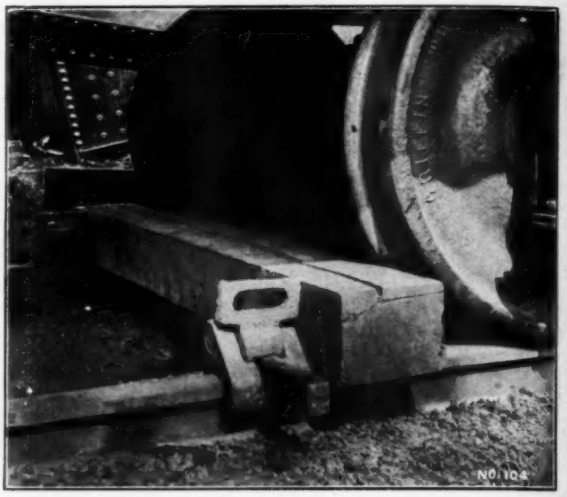

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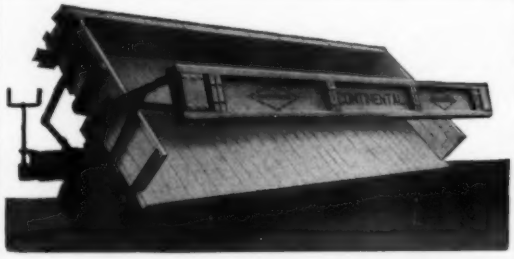
South Milwaukee, Wis.



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